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Mission Bay

DRAFT ENVIRONMENTAL IMPACT REPORT

VOLUME ONE

Highlights & Conclusions

CITY AND COUNTY OF SAN FRANCISCO
DEPARTMENT OF CITY PLANNING

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A USER'S GUIDE TO THE MISSION BAY EIR

The Mission Bay Environmental Impact Report (EIR) describes environmental effects of three alternative development programs and ten variations on them. In describing environmental effects, the EIR takes into account other growth expected for San Francisco and the Bay Area. Impacts of potential development at Mission Bay and other cumulative development within San Francisco and the region are combined to show how future growth will affect the environment. The EIR is divided into several elements to meet the needs of the many different people the Department of City Planning expects to use it.

Volume One (Highlights & Conclusions) contains the Executive Summary and the Highlights & Conclusions chapter. The Executive Summary provides a brief overview of the EIR, including project Alternatives and environmental impacts.

Highlights & Conclusions provides a broad overview and digest of the environmental effects of Mission Bay. It distills and presents for easy reference the information the Department believes of most interest to the general public, warranting wide distribution and consideration. It has been drafted to be easily understood by the reader. The Highlights & Conclusions chapter will be the choice for those people who want to understand in a general yet comprehensive way what effect the Mission Bay Alternatives would have on the environment. It provides the basic environmental story for this development. While the Department believes that many people will find the information they wish within this one volume, it should be remembered that this volume is a summary and should not be considered a substitute for the more comprehensive technical detail presented in Volume Two.

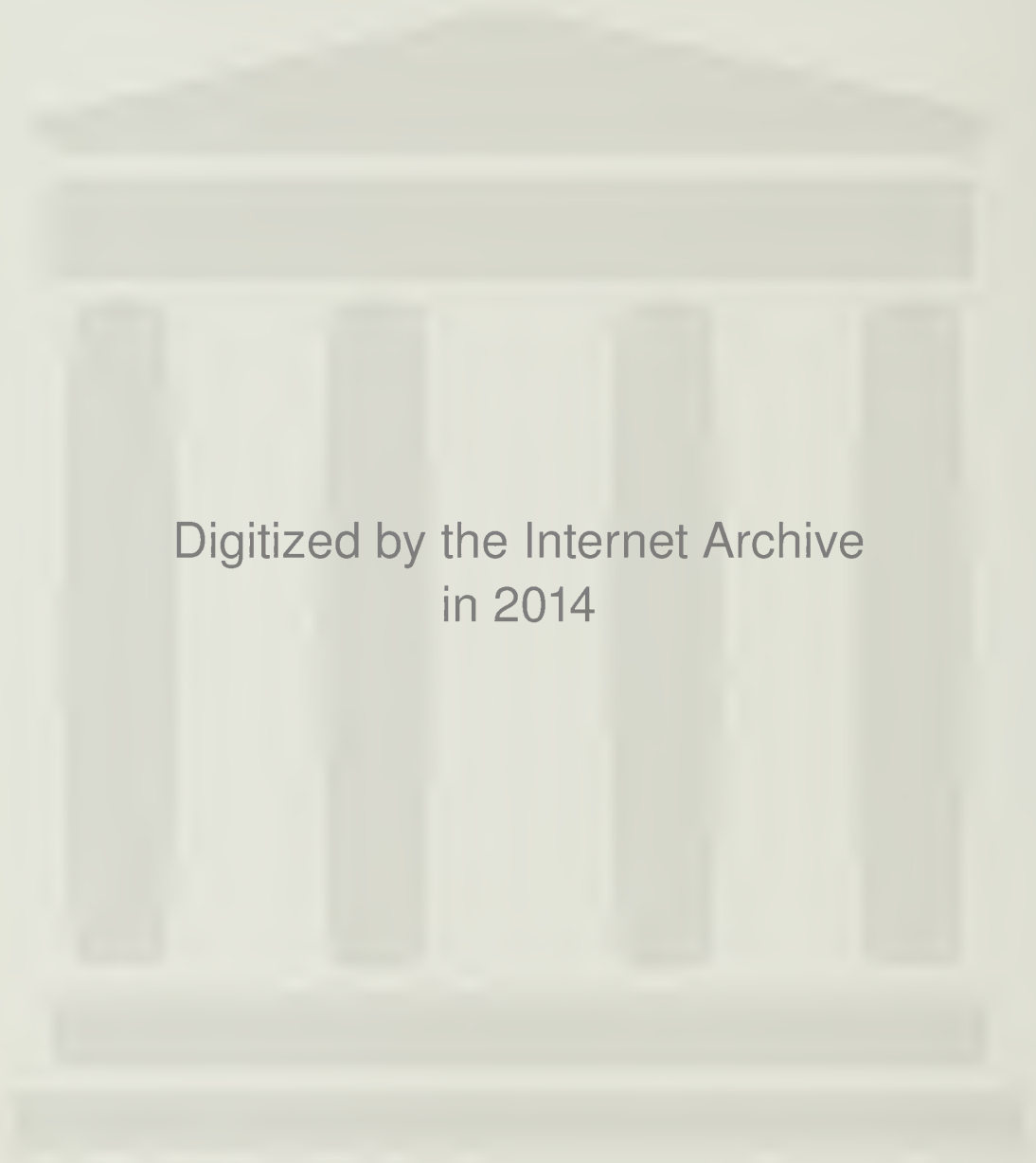
Highlights & Conclusions also serves as a reference guide to Volume Two of the EIR. It directs the reader to where more detailed information on the project description, existing conditions, impacts of the Alternatives, and measures identified to mitigate those impacts is available.

Volume Two (Technical Analyses) provides a comprehensive and technical presentation of the environmental analyses. Much more detail is provided on the Alternatives and their impacts, and some environmental effects are described which the Department did not believe of sufficient general interest to include in Volume One. Volume Two contains the detailed Environmental Setting, Impact, and Mitigation chapter and presents the basic assumptions and methods used to forecast impacts. Volume Two will be of particular use to those interested in understanding the analytical foundations of the EIR and the full spectrum of impact analyses. The material presented is sometimes complex, and often requires very precise language that systematically builds upon prior concepts.

Volume Two is divided into discrete topical sections. Those interested in detailed information only in particular areas, such as transportation, can use the relevant section of Volume Two and dispense with other portions. Others may wish to read the entire Volume Two.

Volume Three (Appendices) consists of very technical background information and descriptions of methods used to analyze the environmental impacts presented in Volume Two. The Appendices are likely to be of use to those with a highly technical interest in specific subjects covered by the EIR.

Background Materials and Supporting Documentation consist of technical documents and calculations used in preparing the EIR, and further document the analytical process used. They are in the Department's files and are available for inspection during normal business hours at 450 McAllister Street, Room 401, but are not published for public distribution due to their limited general interest.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VOLUME ONE TABLE OF CONTENTS

CHAPTER I – EXECUTIVE SUMMARY

CHAPTER II – HIGHLIGHTS & CONCLUSIONS

CONTEXT II.1

STUDY APPROACH & ORGANIZATION II.4

EIR ALTERNATIVES II.7

PUBLIC PLANS & POLICIES II.20

APPROVAL PROCESS II.24

BUSINESS ACTIVITY & JOBS II.27

HOUSING & POPULATION II.32

COMMUNITY SERVICES II.37

TRANSPORTATION II.42

AIR QUALITY II.57

NOISE II.59

ENERGY II.62

ARCHITECTURAL RESOURCES & URBAN DESIGN II.64

CULTURAL RESOURCES II.72

GEOLOGY & SEISMICITY II.76

HYDROLOGY & WATER QUALITY II.82

VEGETATION & WILDLIFE II.86

HAZARDOUS WASTES II.89

CONSTRUCTION II.94

GROWTH INDUCEMENT II.101

VARIATIONS ON ALTERNATIVES II.104

UNAVOIDABLE SIGNIFICANT ENVIRONMENTAL EFFECTS II.114

REPORT AUTHORS II.115

LIST OF FIGURES

II.1	REGIONAL LOCATION	II.1
II.2	MISSION BAY PROJECT AREA	II.2
II.3	MISSION BAY FROM THE AIR	II.3
II.4	THE DOWNTOWN & VICINITY	II.5
II.5	NEARBY AREAS	II.6
II.6	ALTERNATIVE A LAND AREA BY USE AT BUILD-OUT	II.7
II.7	ALTERNATIVE A, 2000	II.8
II.8	ALTERNATIVE A, 2020	II.9
II.9	MISSION BAY BUILDING SPACE AT BUILD-OUT	II.11
II.10	ALTERNATIVE B, 2000	II.12
II.11	ALTERNATIVE B, 2020	II.13
II.12	ALTERNATIVE B LAND AREA BY USE AT BUILD-OUT	II.14
II.13	ALTERNATIVE N LAND AREA BY USE AT BUILD-OUT	II.15
II.14	ALTERNATIVE N, 2000	II.16
II.15	ALTERNATIVE N, 2020	II.17
II.16	MISSION BAY EMPLOYMENT AT BUILD-OUT	II.18
II.17	MISSION BAY RESIDENT POPULATION IN ALTERNATIVES A AND B	II.19
II.18	CENTRAL WATERFRONT PLAN SUBAREAS, PORT JURISDICTION, AND BCDC PORT PRIORITY USE AREA	II.21
II.19	PORT OF SAN FRANCISCO CONTAINER TERMINAL	II.22
II.20	POSSIBLE RELOCATION OF PORT FACILITIES	II.23
II.21	MISSION BAY JOBS BY OCCUPATIONAL CATEGORY, EXISTING AND BUILD-OUT	II.28
II.22	SAN FRANCISCO EMPLOYMENT GROWTH, EXISTING TO BUILD-OUT	II.31
II.23	NEW HOUSING AT SOUTH BEACH AND OLDER HOUSING ON POTRERO HILL	II.34
II.24	WHERE PEOPLE WORKING IN THE DOWNTOWN & VICINITY WOULD LIVE, BUILD-OUT	II.35
II.25	SAN FRANCISCO FIRE ENGINE COMPANY	II.37
II.26	PUBLIC SCHOOL SPACE FOR MISSION BAY STUDENTS	II.38
II.27	ALTERNATIVE A OPEN SPACE AT BUILD-OUT	II.39
II.28	ALTERNATIVE B OPEN SPACE AT BUILD-OUT	II.39
II.29	ALTERNATIVE N OPEN SPACE AT BUILD-OUT	II.40
II.30	LEVEL OF SERVICE AT INTERSECTIONS	II.43
II.31	INTERSECTION LEVELS OF SERVICE DURING THE P.M. PEAK PERIOD AT BUILD-OUT, ALTERNATIVE A	II.44
II.32	INTERSECTION LEVELS OF SERVICE DURING THE P.M. PEAK PERIOD AT BUILD-OUT, ALTERNATIVE B	II.45
II.33	INTERSECTION LEVELS OF SERVICE DURING THE P.M. PEAK PERIOD AT BUILD-OUT, ALTERNATIVE N	II.46
II.34	PROJECTING OUTBOUND P.M. PEAK TRAVEL	II.50
II.35	MODAL SHIFT	II.52
II.36	TRAFFIC CONGESTION OUTBOUND FROM SAN FRANCISCO DURING THE AFTERNOON COMMUTE PERIOD	II.55
II.37	INCREASE IN MISSION BAY VEHICLE EMISSIONS WITHIN SAN FRANCISCO COUNTY	II.58
II.38	TYPICAL NOISE LEVELS	II.60
II.39	ANNUAL BUILDING ENERGY CONSUMPTION AT BUILD-OUT	II.63
II.40	ANNUAL TRANSPORTATION ENERGY CONSUMPTION AT BUILD-OUT	II.63

List of Figures

II.41: FIRE STATION 30 ..... II.64
II.42: VIEW FROM POTRERO HILL II.65
II.43: CONCEPTUAL VIEW, ALTERNATIVE A, THIRD AND TOWNSEND STREETS II.66
II.44: CONCEPTUAL VIEW, ALTERNATIVE B, THIRD AND TOWNSEND STREETS II.67
II.45: CONCEPTUAL VIEW, ALTERNATIVE B, CHINA BASIN CHANNEL II.68
II.46: CONCEPTUAL VIEW, ALTERNATIVE N, CHINA BASIN CHANNEL II.69
II.47: CONCEPTUAL VIEW, ALTERNATIVE A, THIRD, FOURTH, AND MISSION ROCK STREETS II.69
II.48: CONCEPTUAL VIEW, ALTERNATIVE B, THIRD, FOURTH, AND MISSION ROCK STREETS II.70
II.49: RELATIVE SHADOW LENGTH BY SEASON AND TIME OF DAY II.71
II.50: SAN FRANCISCO AND PACIFIC GLASS WORKS II.72
II.51: CHINA BASIN CHANNEL, 1921 ..... II.73
II.52: POTENTIAL CULTURAL RESOURCE AREAS II.74
II.53: THIRD STREET BRIDGE II.75
II.54: SUBSURFACE PROFILE THROUGH CENTER OF MISSION BAY II.76
II.55: MAJOR BAY AREA FAULTS II.77
II.56: MISSION BAY POPULATION EXPOSED TO EARTHQUAKE HAZARDS II.81
II.57: CHINA BASIN CHANNEL II.83
II.58: DIVISION STREET SEWER OUTFALL II.84
II.59: CORMORANT, CHINA BASIN CHANNEL II.87
II.60: THE FILLING OF MISSION BAY II.89
II.61: ARCTIC OIL WORKS II.90
II.62: REMEDIAL ACTION PROCESS II.92
II.63: TYPICAL CONSTRUCTION NOISE LEVELS AT 50 FEET II.95
II.64: CONSTRUCTION ENERGY CONSUMPTION THROUGH BUILD-OUT II.96
II.65: VOLUME OF EXCAVATION AND DREDGING BY BUILD-OUT II.97
II.66: CONTRIBUTIONS OF THE ALTERNATIVES TO SAN FRANCISCO EMPLOYMENT GROWTH, EXISTING TO BUILD-OUT II.101
II.67: CONTRIBUTIONS OF THE ALTERNATIVES TO SAN FRANCISCO HOUSING GROWTH, EXISTING TO BUILD-OUT II.102
II.68: VARIANT 1 ..... II.105
II.69: VARIANT 2 ..... II.106
II.70: VARIANT 4 ..... II.108
II.71: VARIANT 5 ..... II.109
II.72: VARIANT 6 ..... II.110
II.73: CALTRAIN STATION II.113

EXECUTIVE SUMMARY

GUIDE TO THE EIR

The Mission Bay Environmental Impact Report (EIR) is divided into three volumes. In addition to this Executive Summary, Volume One contains the Highlights & Conclusions chapter, which provides an easy-to-read digest of the environmental effects of Mission Bay. Volume Two, Technical Analyses, contains detailed information, including the Environmental Setting, Impact, and Mitigation chapter. Volume Three contains the Appendices, consisting of technical background information and descriptions of analytical methods used in the EIR. Additional supporting documentation and calculations are on file at the Department of City Planning.

CONTEXT

The Project Area is about one mile south of San Francisco's financial district. It includes land both north and south of China Basin Channel, and is bounded generally by Townsend Street on the north, Seventh Street and Pennsylvania Avenue on the west, Mariposa Street on the south, and China Basin and Third Streets on the east.

Once a shallow bay, the Project Area covers about 325 acres near the eastern shoreline of San Francisco. Beginning in the 1860s, the tidelands were filled and used for railroad and industrial activities. Today the land in Mission Bay remains relatively open, with transportation-related and industrial uses still predominant. Development plans for Mission Bay have been proposed since 1981; Santa Fe Pacific Realty Corporation is the current project sponsor.

STUDY APPROACH & ORGANIZATION

The Mission Bay EIR analyzes three development Alternatives, and ten variants on those Alternatives. Most sections in the EIR, such as air quality, noise, and energy, are divided into Setting, Impact, and Mitigation. Setting describes existing conditions. Impact describes the effects of development for each Alternative. The EIR also takes into account other growth expected for San Francisco and the Bay Area. Where appropriate, effects are analyzed both at the interim analysis year of 2000, and at the approximate build-out date of 2020. For other topics, the effects of the Alternatives at build-out are analyzed. Mitigation addresses measures to reduce or eliminate adverse impacts.

Sections on employment and housing and population also discuss the Future Context (cumulative growth scenarios) for each Alternative. Cumulative growth scenarios for the San Francisco Downtown & Vicinity, the rest of the city, and the region are considered. Downtown San Francisco and surrounding neighborhoods, including Mission Bay, are defined as the Downtown & Vicinity. Neighborhoods and commercial areas near Mission Bay are defined as Nearby Areas.

EIR ALTERNATIVES

The three land use programs of the EIR Alternatives are diverse. Alternative A is a mixed-use development containing commercial and residential uses. Alternative B is predominantly housing and open space, and contains less commercial space than Alternative A. Alternative N is the No Project Alternative. It presents one likely development scenario that could be expected to occur in the future under existing M-2 (Heavy Industrial) zoning and Central Waterfront Plan policies for the Project Area. The presentations identify the land use programs at full build-out, as well as the amounts and locations of development assumed to occur by 2000. Employment and population in the Project Area associated with development are described for each Alternative.

PUBLIC PLANS & POLICIES

The key San Francisco policy document for the Mission Bay area is the Central Waterfront Plan. Alternatives A and B generally do not respond to the plan's objectives for maritime use east of Third Street. Alternative N would enable industrial and maritime-related use to continue. The Central Waterfront Plan calls for a new mixed-use neighborhood west of Third Street, consistent with Alternatives A and B but inconsistent with Alternative N. Port of San Francisco

and regional Seaport Plan policies also propose expanded maritime use east of Third Street. Alternatives A and B would not respond to those objectives, but Alternative N would permit port expansion. Alternatives A and B would require amendments to the City Planning Code and zoning maps, while Alternative N would retain existing zoning in the Project Area.

APPROVAL PROCESS

Subsequent to publication of this Mission Bay Draft EIR, a Final EIR will be prepared. The Final EIR will consist of the Draft EIR, a summary of comments received during public review of the Draft EIR, and responses to those comments. The Final EIR would require certification by the City Planning Commission before approval and implementation of the Mission Bay project. A development agreement between Santa Fe Pacific Realty Corporation and the City would define the terms of city approval. Necessary Master Plan, Planning Code, and Zoning Map amendments would require action by the City. A series of city, regional, state, and federal permits and approvals would be required for various aspects of the development.

BUSINESS ACTIVITY & JOBS

In all Alternatives, Mission Bay business activity and employment would increase substantially. The number and types of jobs would vary among Alternatives, as would the effects of the Alternatives on existing businesses in the Project Area. Mission Bay would also affect the pace of growth of business activity and employment in Nearby Areas. The Alternatives would result in different amounts and locations of business activity and employment growth in the City. From a regional perspective, the Alternatives would affect where employment growth occurred, but not the total amount expected.

HOUSING & POPULATION

The effects of the Alternatives on San Francisco's housing market, trends in nearby residential neighborhoods, and the regional housing market are generally discussed. Alternatives A and B would add to the City's housing supply, with new housing exceeding the demand for City housing attributable to job growth in Mission Bay. In Alternative N, there would be no housing to offset job growth. Although there would not be much difference among Alternatives in the citywide housing market, there would be some differences for certain segments of the market. In nearby residential areas some features of the Alternatives would add to demand pressures on the housing stock. Those pressures would be offset in Alternatives A and B because Mission Bay housing would absorb some of that demand. There would not be much difference among Alternatives in their effects on regional housing market conditions.

COMMUNITY SERVICES

Mission Bay would affect the City's fire, police, public schools, and recreation and park services. Potential impacts on libraries, public health, water supply, sewers and wastewater treatment, solid waste, and streets are also examined. By build-out, Alternatives A and B would require additional fire and police personnel, equipment, and building space. Alternatives A and B would also need new schools. Alternative N would require fewer community services and facilities. Open space proposed under all Alternatives would meet the demand created by Mission Bay employees, but would fall short of the demand created by residents in Alternatives A and B.

TRANSPORTATION

In most instances, local transportation systems such as streets, rail tracks, and MUNI routes serving the Project Area would operate at acceptable levels in 2000. By 2020, roadway and transit improvements, additional parking, and rail reroutings would be necessary.

The transportation impact analysis also evaluates travel generated by Mission Bay in the context of growth in travel projected for the rest of the City and Bay Area. Independent of travel generated by Mission Bay, it is growth in the City and region that would result in the greatest impact on most of the transportation systems studied. Those cumulative im-

pacts are evaluated for freeway and transit systems serving San Francisco and providing connections to the North Bay, East Bay, and South Bay travel corridors. By 2000, congested highway conditions would result in a shift from autos to higher use of transit and ridesharing by travelers from the Downtown & Vicinity. The East Bay would be the most congested corridor, the Peninsula would be the least. By 2020, travel demand would exceed the capacity of regional transportation systems. To serve regional growth, expanded freeway and transit systems would be required.

AIR QUALITY

Motor vehicles would be Mission Bay's primary source of air pollution. Emissions of several air pollutants would exceed significance thresholds established by the Bay Area Air Quality Management District. Emissions of hydrocarbons and nitrogen dioxide, precursors of ozone, could contribute to continuing occasional violations of ozone standards in the Bay Area. Carbon monoxide concentrations at congested intersections in and near Mission Bay would not exceed state or federal standards.

NOISE

San Francisco compatibility guidelines for community noise indicate that both existing and future noise levels in Mission Bay would exceed recommended levels for some proposed land uses under all Alternatives. Aside from construction noise, motor vehicles would be the major source of noise in Mission Bay. Noise levels would increase noticeably with development of Mission Bay, regardless of Alternative. Mitigation measures would be required to buffer residents and employees from noise.

ENERGY

Building energy consumption in the Project Area could equal 190,000 to 360,000 barrels of crude oil per year at build-out. Annual transportation energy consumption could equal 280,000 to 470,000 barrels. By considering energy consumption in the design of Mission Bay, steps could be taken to increase energy efficiency and reduce total energy consumed.

ARCHITECTURAL RESOURCES & URBAN DESIGN

Alternatives A and B would transform Mission Bay into new mixed-use neighborhoods, a dramatic change in the character of the area. Alternative N would retain or expand existing service, industrial, and maritime land uses. Closed Fire Station 30, the only notable architectural resource in Mission Bay, would be rehabilitated for community facilities in Alternatives A and N, but demolished in Alternative B. New development up to eight stories in height in Alternatives A and B would obstruct some views of the Project Area from Potrero Hill and Nearby Areas; some views of San Francisco Bay would be affected. Alternative N would have lower-scale, mostly one- to four-story buildings with less impact on long-range views. Shadows from buildings in the Alternatives would not reach existing parks, but would shade Project Area open space depending on season and time of day. The low- and mid-scale development in all Alternatives would have little effect on wind.

CULTURAL RESOURCES

While the potential for prehistoric resources is low, archival research indicates that specific areas of Mission Bay probably contain subsurface historic artifacts. New construction under all Alternatives could disturb subsurface historic resources. Closed Fire Station 30, which may be eligible for the National Register of Historic Places, would be preserved in Alternatives A and N but demolished in Alternative B. Basalt block pavement on King and Sixth Streets, considered of local historic interest, would be affected by all Alternatives.

GEOLOGY & SEISMICITY

A major earthquake is an inevitable part of the San Francisco Bay Area's future. The odds of a major earthquake within the next 20 years are about one in ten. Artificial fill and Bay Mud underlying Mission Bay exacerbate groundshaking and secondary seismic hazards, as well as create settlement problems. However, seismic hazards can be greatly reduced through proper design and other geologic constraints can be minimized.

HYDROLOGY & WATER QUALITY

Water quality in China Basin Channel has been degraded by sewage overflows and industrial activities. Sediments on the channel bottom contain relatively high levels of inorganic contaminants. Dredging of the channel under Alternative A could affect water quality at the dredge site, and, if Bay or ocean disposal were selected, at the disposal site. Runoff from Mission Bay under all Alternatives could be accommodated by the sewer system. Runoff quality could improve with the elimination of existing sources of pollutants, although contaminants such as fertilizers, pesticides, and herbicides from homes and businesses could offset any improvement. Groundwater in Mission Bay is brackish (salty) and potentially contaminated; no uses of Mission Bay groundwater exist or are proposed. Wetlands proposed in Alternative B could be adversely affected by poor water quality.

VEGETATION & WILDLIFE

There are no rare or endangered plants or fish in the Project Area; the California brown pelican, an endangered species, is occasionally present in the area but probably would not be adversely affected. Three wetlands created in Alternative B would provide valuable wildlife habitat; no wetlands would be created in the other Alternatives. Under all Alternatives, landscaped open space would provide habitat for animals that are relatively tolerant of human activities. Dredging in China Basin Channel proposed in Alternative A could have local effects on aquatic life at both the dredge site and the disposal site. Dredging could adversely affect Pacific herring spawning at the mouth of the channel if it occurred during the peak spawning season.

HAZARDOUS WASTES

Analysis of potential hazardous waste contamination in the Project Area addresses the filling of Mission Bay, underground storage tanks, previous and existing industries, surface conditions, types of hazardous materials potentially present, implications for development, and potential health risks. Mission Bay's history suggests a possibility of hazardous waste contamination in some areas, although that has not been confirmed by soil or groundwater testing. Sources of contaminants could include contaminated fill materials, leaking underground storage tanks, or hazardous materials spilled or disposed of by industries in the area. Surface conditions also indicate the potential for contamination, since surface staining, trash, and debris are common in open areas. Some toxic materials persist in the environment and could still be present in soil or groundwater, while others would no longer be hazardous unless sealed in containers. If not located and cleaned up, contaminants could present health risks to construction workers or occupants. The draft Mission Bay Project Hazards Mitigation Program (a background document for the EIR on file at the Department of City Planning) addresses hazardous materials in more detail, outlines an investigation program, and provides a framework for any necessary clean-up.

CONSTRUCTION

Construction-related impacts on employment, transportation, air quality, noise, energy, geology, hydrology and water quality, vegetation and wildlife, and hazardous wastes are addressed in one section of the Highlights & Conclusions chapter. In Volume Two, detailed analyses of construction effects and measures to mitigate impacts are discussed under each environmental impact topic. Construction of Mission Bay would take place over a 30-year period. Construction would provide jobs, increase vehicle trips, raise dust, generate noise, consume energy, involve excavation and dredging, and expose soil to erosion. Construction could require clean-up of hazardous wastes. Usually dismissed as short-term impacts, construction impacts from development in Mission Bay would have long-term effects on the Project Area.

GROWTH INDUCEMENT

All Mission Bay Alternatives would add to business activity and employment in the City; Alternatives A and B would add to housing and population in the City. Differences in citywide growth do not parallel differences among Alternatives in Project Area employment or housing because, for example, less growth in Mission Bay would mean more commercial or residential development elsewhere in the City. For the region, there would not be much difference among Alternatives in total employment and population growth, but there would be some differences in the locations for growth and development in the Bay Area. Those different patterns for the

location of job growth in the region would result in different locations for population growth and associated impacts stimulated by employment growth. Some Mission Bay activity would support business outside the Project Area through the multiplier relationship, while, at the same time, some economic activity in Mission Bay would be supported by businesses outside the Project Area. Spillover effects of Mission Bay would influence the pace and type of growth and change in Nearby Areas.

VARIATIONS ON ALTERNATIVES

In addition to the three Alternatives A, B, and N, ten variants of the Alternatives are evaluated in the EIR. Each variant is based on one or more of the Alternatives, with certain changes. Differences between the impacts of each variant and its parent Alternative are addressed.

Six variants involve changes in land use and density. Those variants would: 1) Add 1,000 housing units to Alternative N; 2) Replace residential, open space, and S/LI/RD uses east of Third Street in Alternative B with Port-Related/M-2 uses; 3) Reduce housing in Alternative B from 10,000 to 7,700 units; 4) Replace some S/LI/RD in Alternative A with retail, personal service, and community facility uses; 5) Replace some S/LI/RD in Alternative A with offices; and 6) Increase height limits from 110 feet to 220 feet for some residential structures along Fifth Street in Alternative B.

Four variants involve changes in other aspects of development. They would: 7) Allow offices as a primary S/LI/RD use in Alternatives A and B; 8) Vary the amount and size of affordable housing units in Alternatives A and B; 9) Keep the CalTrain station at its present location in Alternatives A and B; and 10) Reduce seismic hazards in all Alternatives.

UNAVOIDABLE SIGNIFICANT ENVIRONMENTAL EFFECTS

Significant impacts resulting from approval of one of the Alternatives or a variant of the Alternatives that could not be mitigated by changes in or additions to the project are listed. Unavoidable significant effects are identified in the areas of: change in land use; foreclosing the option of marine container facilities in the Project Area; cumulative transportation congestion; cumulative air quality effects; exposure of more people to seismic hazards; and water quality impacts from dredging.

CONTEXT

This section describes the Mission Bay Project Area and the historical and planning context of the project. The Project Area, once a shallow bay, covers about 325 acres near the eastern shoreline of San Francisco. Beginning in the 1860s, the tidelands were filled and used for railroad and industrial activities. Today the land in Mission Bay remains relatively open, with transportation-related and industrial uses still predominant. Development plans for Mission Bay have been proposed since 1981; Santa Fe Pacific Realty Corporation is the current project sponsor.

Location

The Project Area is about one mile south of San Francisco's financial district. The Project Area includes land both north and south of China Basin Channel, and is bounded generally by Townsend Street on the north, Seventh Street and Pennsylvania Avenue on the west, Mariposa Street on the south, and China Basin and Third Streets on the east.

For more detail on Mission Bay's location and boundaries, see Volume Two, p. III.1, and p. III.10, note 1.

History

Mission Bay was originally a shallow bay of about 260 acres. In the 1860s Southern Pacific and Western Pacific Railroads were each granted 30 acres of tidelands for a railroad terminal. By acquiring rights-of-way and increasing its land holdings and water rights, Southern Pacific eventually owned most of Mission Bay.

Most of the Project Area consists of landfill. Filling began in the 1860s when the northern shoreline of Mission Bay was designated an official city dump. Fill from other sources was added through the late 1800s and by the turn of the century only the center of Mission Bay was

SOURCE: Environmental Science Associates, Inc.

Figure II.1: Regional Location. *Mission Bay encompasses about 325 acres near the eastern shoreline of San Francisco.*

open water. Filling was completed after the 1906 earthquake and fire when Mission Bay became a repository for earthquake rubble and debris. All that remained of Mission Bay was the narrow inlet of China Basin Channel.

Around 1900 the Atchison, Topeka and Santa Fe Railway developed transportation facilities on 24 acres of landfill east of Illinois Street previously owned by Western Pacific. Transportation and industrial activities predominated throughout Mission Bay's history. The area was used by a variety of industries in its early history, such as lumber, shipyards, glass-making, warehousing, and rail uses; Mission Bay is still used primarily for industrial and transportation activities, some of which are maritime-related.

For more detail on Mission Bay's history, see the section on Cultural Resources in this chapter and Volume Two, pp. III.1 and 3 and VI.J.1-13.

Development Proposals

Southern Pacific proposed to develop Mission Bay in 1981, and revised its proposal in 1983, but both proposals were considered inconsis-

tent with City Master Plan Elements that called for housing, local employment, and maritime use in the Project Area. In late 1983 the parent companies of Southern Pacific and Santa Fe merged to form Santa Fe Southern Pacific Corporation whose real estate subsidiary, Santa Fe Pacific Realty Corporation (SFP), manages all land previously owned by Southern Pacific and Santa Fe in Mission Bay.

In 1984 a letter from Mayor Feinstein outlined the type of development she would support in Mission Bay, and a tentative understanding was reached with the project sponsor on land use guidelines for the Project Area. In 1985 the Department of City Planning, community representatives, other government agencies, and Santa Fe Pacific began a joint planning effort to develop objectives and policies for Mission Bay. That effort resulted in the 1987 Mission Bay Plan, Proposal for Citizen Review.

The Mission Bay Plan, Proposal for Citizen Review includes: 7,700 to 7,960 residential units; 2.6 to 4.1 million square feet of offices; 2.3 to 2.6 million square feet of service, light industrial, or research and development space; 300,000 square feet of retail space; 200,000 square feet for community use; 500 hotel rooms; a ballpark; and up to 78 acres of open space.

This Mission Bay Draft EIR examines the physical consequences of three alternative development plans and identifies mitigation measures for adverse impacts on the environment. The Mission Bay Plan, Proposal for Citizen Review, although similar to EIR Alternative A, is not directly analyzed in the EIR. The "Plan" for Mission Bay is recognized to be an evolving program, one that will continue to be refined in response to public review and comment, and ongoing negotiations between the City and project sponsor even after the Final EIR is completed. As a result, the objective of the EIR is to analyze alternatives that among them cover the range of land use program elements and issues contemplated in the on-going planning effort for Mission Bay.

Figure II.2: Mission Bay Project Area. *Mission Bay, once an extension of San Francisco Bay, was filled in the late 1800s and early 1900s. The area is still relatively open, used primarily for transportation and industrial activities.*

SOURCE: Environmental Science Associates, Inc

For more detail on previous development proposals, see Volume Two, pp. III.3-4. See pp. III.4-5 for more information on the Mission Bay Plan, Proposal for Citizen Review, and p. III.5 for information on environmental review. See the section on EIR Alternatives in this chapter for a description of the land use programs.

Mission Bay Project Area

Zoned primarily as an M-2 (Heavy Industrial) Use District, most of Mission Bay is underused or open (rail yards, unattended parking lots, or vacant). The remaining land is used mainly for truck terminals or warehouses.

SOURCE: Santa Fe Pacific Realty Corporation

Figure II.3: Mission Bay from the Air. *Looking north toward downtown San Francisco, Mission Bay is seen as an open, level expanse. It is generally bounded by I-280 on the west and the Bay on the east, and divided by China Basin Channel.*

The Project Area can be divided into three subareas: north of China Basin Channel, east of Third Street, and west of Third Street. North of China Basin Channel consists primarily of freeway connections and the CalTrain commute station and rail lines. West of Third Street consists of former rail yards, open land, and businesses primarily related to trucking and warehousing. East of Third Street has a higher concentration of businesses, including storage, construction-related, and maritime uses.

Most of the land in the Project Area is owned by Santa Fe Pacific. The Port of San Francisco controls much of the waterfront property; other portions of the Project Area are owned by the City, Caltrans, and a few private entities.

For more detail on the Project Area and subareas, see Volume Two, pp. III.6-8. For information on land ownership, see pp. III.8-9.

STUDY APPROACH & ORGANIZATION

This section describes how the Mission Bay Environmental Impact Report (EIR) is organized. This Draft EIR consists of three volumes. Volume One contains the Executive Summary and Highlights & Conclusions. Volume Two contains the full Technical Analyses. Volume Three, Appendices, consists of background information and descriptions of methodology. The Final EIR will consist of the Draft EIR, a summary of comments received during public review of the Draft EIR, and responses to those comments. The Mission Bay EIR analyzes three development Alternatives, and ten variants on those Alternatives. Most sections in the EIR, such as air quality, noise, and energy, are described according to the following three topics: Setting, Impact, and Mitigation. Setting describes existing conditions. Impact describes the effects of development for each Alternative. The EIR takes into account other growth expected for San Francisco and the Bay Area. Where appropriate, effects are analyzed both at the interim analysis year of 2000, and at the approximate build-out date of 2020. For other topics, the effects of the Alternatives at build-out are analyzed. Measures to mitigate adverse impacts are listed. Sections on employment, and housing and population also discuss the Future Context (cumulative growth scenarios) for each Alternative. Cumulative growth scenarios for the San Francisco Downtown & Vicinity, the rest of the city, and the region are considered. Downtown San Francisco and surrounding neighborhoods, including Mission Bay, are defined as the Downtown & Vicinity. Neighborhoods and commercial areas near Mission Bay are defined as Nearby Areas.

Alternatives

The Mission Bay Environmental Impact Report (EIR) analyzes three development Alternatives for the Project Area at an equal level of detail. Alternatives A and B are integrated development programs. Alternative A combines residential and commercial uses. Alternative B has more housing and open space and less commercial space than Alternative A, and includes three wetlands. Alternative N, the No Project Alternative, describes one likely scenario for development under existing predominantly M-2 (Heavy Industrial) zoning without a master development program for the area. The Alternatives are described more fully in the next section of this chapter. The EIR also analyzes, in less detail, ten variants of the Alternatives. The variants, discussed in the section on Variations on Alternatives later in this chapter, keep most of the main attributes of the Alternatives, modifying only specific features.

For more detail about the study approach for each Alternative, see Volume Two, pp. IV.1-3.

Impact Assessment

Each topic in the EIR is described in terms of Setting, Impact, and Mitigation. Setting describes existing conditions for the year 1985, the mid-decade and a benchmark year used in other planning efforts. Where conditions have changed substantially since 1985, the EIR presents updated information.

The EIR considers the impacts within and near the Project Area of each of the Mission Bay Alternatives. In addition, the EIR addresses cumulative effects of the Alternatives in the context of future commercial and residential development in the Downtown & Vicinity, and the rest of San Francisco and the region. Cumulative analysis focuses on the Downtown & Vicinity, shown in Figure II.4. In addition to Mission Bay, this area includes the C-3 District, South of Market (including Showplace Square), the Northeast Waterfront, and the Civic Center / South Van Ness area. Nearby Areas are defined as the neighborhoods and commer-

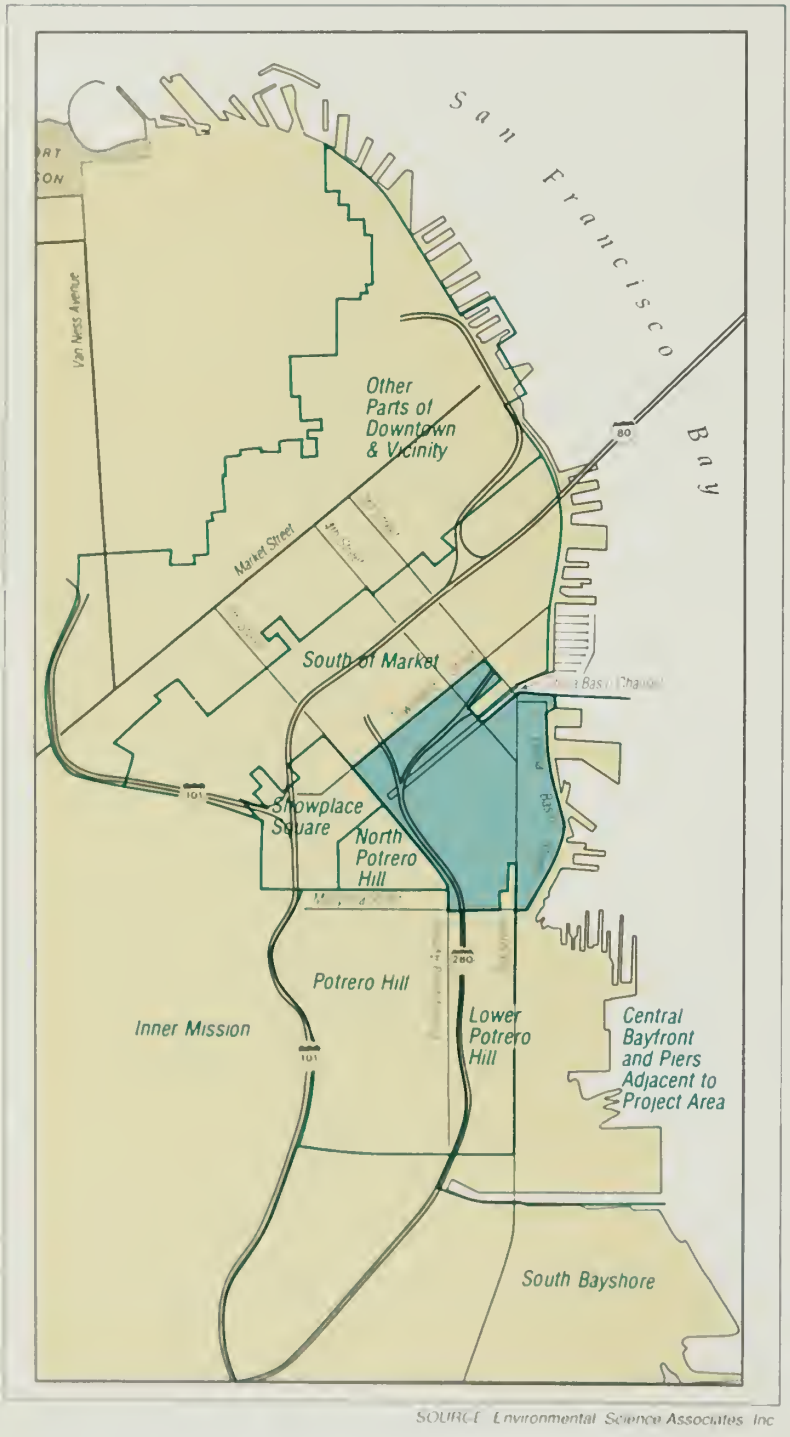
cial and industrial areas in the vicinity of the Project Area that are shown in Figure II.5. Growth in Mission Bay would affect those areas and create local impacts, while growth in Nearby Areas would, in turn, affect Mission Bay.

Many sections in the EIR describe impacts in terms of two analysis years, 2000 and 2020. Mission Bay would be a long-term development, with impacts occurring over many years. Full build-out of Mission Bay would take around 30 years. It is assumed that occupancy of the first buildings would occur around 1990. Accordingly, 2020 is used as the build-out year for the Alternatives. The year 2000, a commonly used benchmark for other city and regional forecasts, was selected as an interim analysis year for comparison. The years 2000 and 2020 are not intended as precise timetables, but as approximate dates. This Highlights & Conclusions chapter focuses on impacts at build-out in 2020.

Economic forecasts (or scenarios) are used to define the future cumulative context for each Alternative. The scenarios were developed specifically for this EIR, in part to reflect influences of the Project Area on cumulative growth. The scenarios for development and economic

SOURCE: Environmental Science Associates, Inc.

Figure II.4: The Downtown & Vicinity. *The Downtown & Vicinity includes some of the Nearby Areas, such as South of Market (which includes Showplace Square), as well as the C-3 District, the Northeast Waterfront, Civic Center / South Van Ness, and Mission Bay.*



SOURCE: Environmental Science Associates, Inc.

Figure II.5 Nearby Areas Nearby Areas encompass the neighborhood and commercial areas in the vicinity of Mission Bay

growth incorporate Proposition M limitations on citywide office development approvals.

The future context scenarios, particularly those for build-out/2020, should be interpreted as reasonable estimates. They represent one possible outcome for the longer-term future, based on trends through the year 2000 and a general concept about how those trends will play themselves out over the years beyond 2000. The cumulative scenarios identify growth patterns for the Downtown & Vicinity and the rest of the City associated with each Alternative. For comparison of Alternatives, differences in patterns of growth are more important than the precise forecasts.

Measures are listed at the end of each environmental topic that would mitigate adverse impacts identified in the analysis for each of the three conceptual Alternatives. The measures that will be included in the Mission Bay project will be determined as part of the project approval process.

For more detail on impact assessment, see Volume Two, p. IV.3 and pp. IV.7-11. See pp. IV.4-7 for information on the Downtown & Vicinity and Nearby Areas. For descriptions of the future context scenarios for the Downtown & Vicinity, the rest of the City, and the region, see pp. VI.B.50-79 and VI.C.36-63 which include the future context estimates of employment, labor force, population, and housing for those areas for 2000 and 2020.

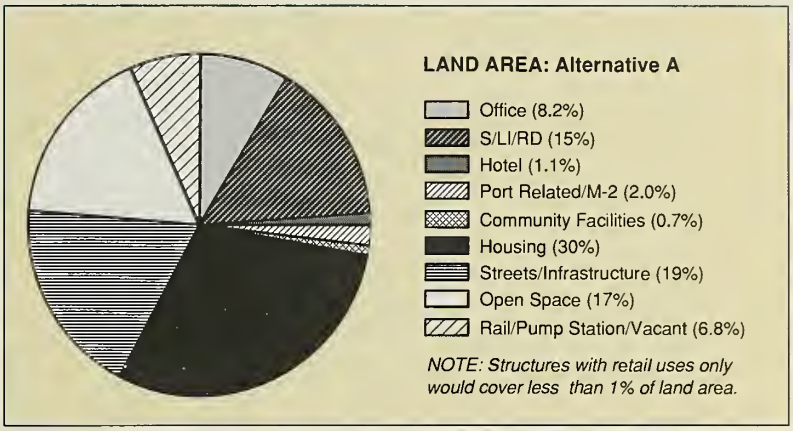
EIR ALTERNATIVES

This section describes the three Alternatives considered in the EIR. The land use programs of the Alternatives are diverse. Alternative A is a mixed-use development containing commercial and residential uses. Alternative B is predominantly housing and open space, and contains less commercial space than Alternative A. Alternative N is the No Project Alternative. It presents one likely development scenario that could be expected to occur in the future under existing M-2 (Heavy Industrial) zoning and Central Waterfront Plan policies for the Project Area. The presentations identify the land use programs at full build-out, as well as the amounts and locations of development assumed to occur by 2000. The specific development patterns assumed for 2000 are not meant to preclude other approaches to developing the Project Area. Employment and population in the Project Area associated with development are described for each Alternative.

Alternative A

Alternative A would be a mixed-use development, combining residential and commercial uses. It is based on the land use program in the Environmental Evaluation Application submitted to the City by the project sponsor. It is also similar to the program described in the Mayor's letter and the Mission Bay Plan, Proposal for Citizen Review, with additional service, light industrial, and research and development (S/LI/RD) space occupying land outside the area covered by the Mayor's letter.

The 4.1 million square feet of office space in Alternative A would be concentrated in six northern blocks of the Project Area fronting Townsend, King, and Berry Streets. About 7,700 dwelling units at various densities would radiate out from the center of the Project Area. This Alternative would have about 3.6 million square feet of S/LI/RD space in the southern



SOURCE: Environmental Science Associates, Inc.

Figure II.6: Alternative A Land Area by Use at Build-Out.
Alternative A, an integrated development program, contains a mix of residential and commercial land uses. (Land uses correspond to the legend starting at the top and moving clockwise around the circle; the percent of land area occupied by each use is shown in parentheses.)

S/LI/RD

Alternatives A and B would contain service / light industrial / research and development (S/LI/RD) space. S/LI/RD would vary in the types and quality of structures and uses. The buildings would be low- to mid-rise with large, flexible-plan floor plates. Some outdoor areas could be used for storage of equipment and supplies. S/LI/RD would include the following uses:

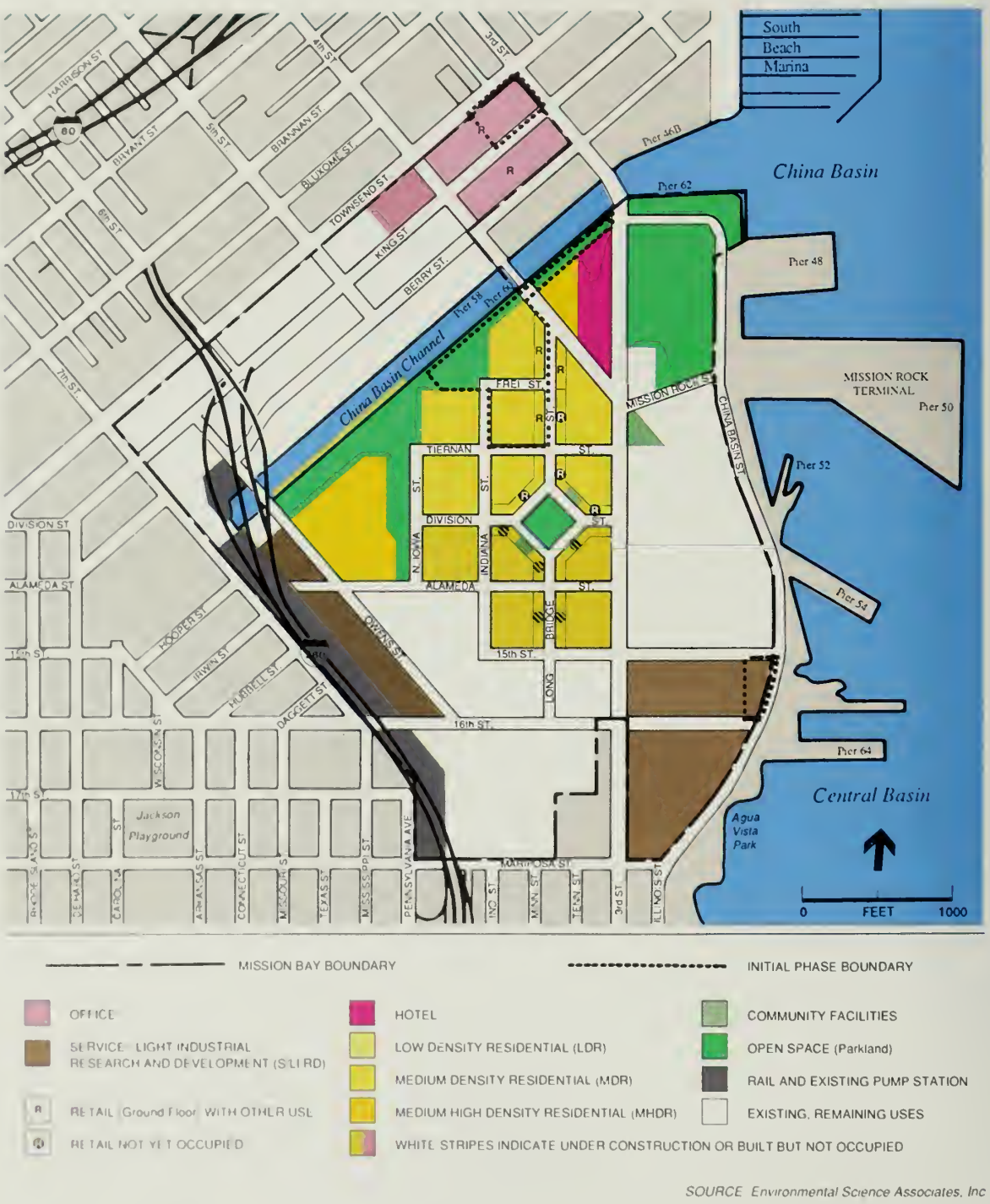
Service Industrial

- *vehicle / equipment leasing and rental, and businesses providing parts and supplies*
- *service businesses supporting Mission Bay, downtown, and nearby business areas*
- *data processing, communications, delivery, and reproduction services*
- *warehouse / distribution or transporation service companies*
- *small light-manufacturing businesses*

Light Industrial / Research and Development

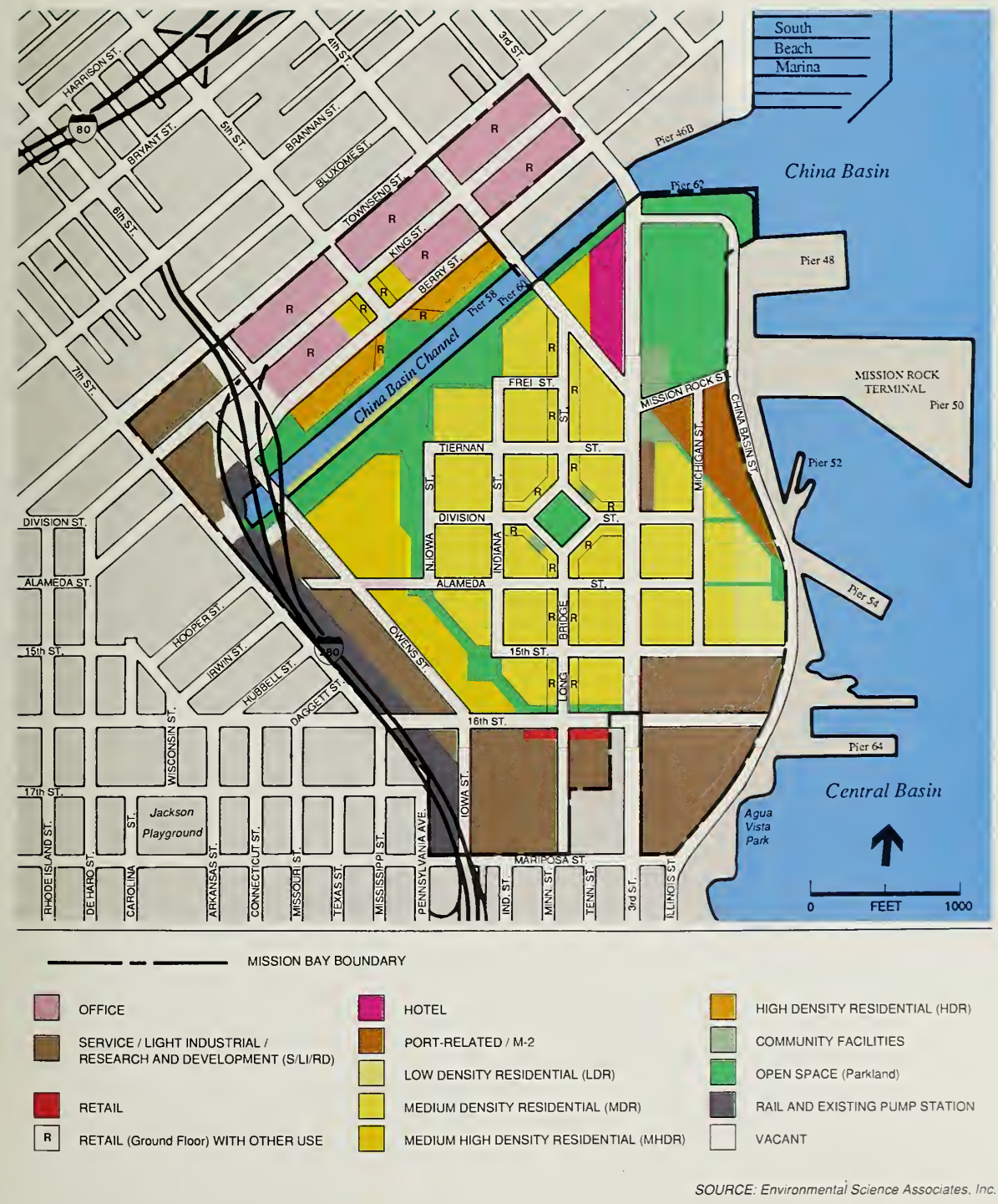
- *technology-oriented manufacturing companies*
- *research and development facilities*
- *headquarters / administrative-support offices that are accessory to primary manufacturing, distribution, or research and development functions*
- *institutional uses*

Wholesale / Showroom



SOURCE: Environmental Science Associates, Inc.

Figure II.7: Alternative A, 2000. *This figure illustrates development under Alternative A assumed to occur by 2000. It also shows the initial phase of development, expected to begin immediately after project approval with occupancy beginning around 1990. The initial phase would consist of about 400,000 square feet of office space, 50,000 square feet of S/LI/RD, 27,000 square feet of retail, and 400 medium-density dwelling units.*



SOURCE: Environmental Science Associates, Inc.

Figure II.8: Alternative A, 2020. *At build-out, Alternative A would have about 7,700 housing units and eight million square feet of commercial space, plus a 500-room hotel.*

Housing

Multi-family housing would develop in Alternatives A and B in varying amounts and densities. No new housing is included in Alternative N. Some residential buildings could have retail uses on the ground floor. Landscaped pedestrian and seating areas, sun terraces, and tot lots would be provided at ground level or on top of parking podium levels. Parking would be in structures or underground.

Low-density residential (LDR) would be two to four stories high and up to 50 units per acre. Medium-density residential (MDR) would range from four to six stories, up to 85 units per acre. Six- to eight-story medium-high density residential (MHDR) would have up to 120 units per acre. High-density residential (HDR) buildings in Alternative A would be six to eight stories high with densities up to 150 units per acre. For comparison, the average densities of several San Francisco neighborhoods are as follows: Potrero Hill - 27 units per acre; Marina District - 44 units per acre; Russian Hill - 61 units per acre; North Beach/Telegraph Hill - 75 units per acre; and Nob Hill - 103 units per acre.

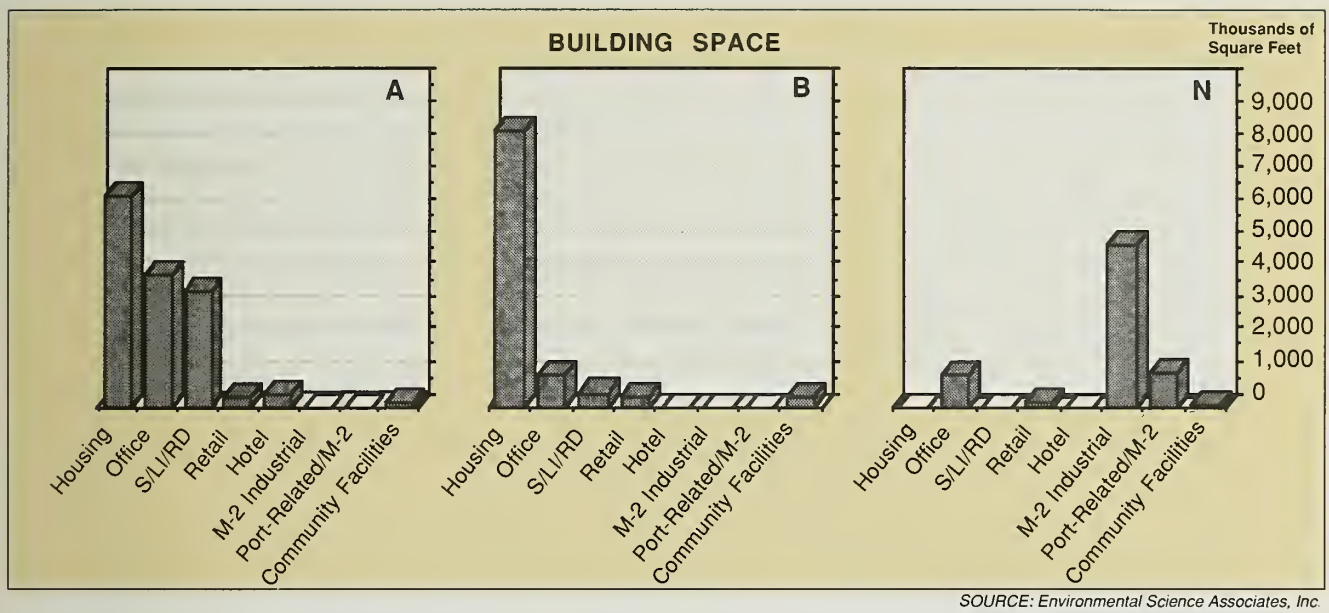
Each category would have ranges of unit sizes. Lower-density development would have larger units than higher-density development. Units would range from 500 to 1,500 square feet, with an average unit size of 850 square feet. The smaller units (500 to 650 square feet) would be studio and one-bedroom units. The average size units would be large one-bedroom and small two-bedroom units. The largest units (1,100 to 1,500 square feet) would accommodate two, three and four bedrooms.

New housing in Mission Bay would include owner-occupied and rental units. The housing would span a range of prices and rents, depending on unit size, location, amenities, and other factors. Housing prices could range from about $100,000 to $300,000 (in 1984 dollars), with some higher-priced units as well. In accordance with the Mayor's letter, 30% of the residential units would be "affordable," averaging $125,000 in 1984 dollars. The project sponsor would provide half of the affordable units; the other half would be provided by the City.

and western portions of the Project Area. About 250,000 square feet of retail space would be north of the channel and along Long Bridge Street. A 500-room hotel would front Third Street in the Banana Triangle, the triangular block bounded by Third Street, Fourth Street, and China Basin Channel.

Alternative A would reserve about 2.4 acres for community facilities, including restored Fire Station 30 (now vacant). There would be about 6.5 acres of port-related land east of Third Street. Open space would include a park near China Basin, landscaped areas along China Basin Channel, and a curved pedestrian corridor linking the channel open space with Third and 16th Streets. In total, there would be about 55.3 acres of public open space, including the 12-acre China Basin Channel.

China Basin Channel would be dredged as part of site preparation. The 20 houseboat berths and 35 pleasure-craft berths in the channel would be retained. The CalTrain commute station would be moved to Seventh and Channel Streets. Commuter rail tracks under I-280



SOURCE: Environmental Science Associates, Inc.

would remain, extending southeast and south along the existing alignment.

As part of the I-280 Transfer Concept Program, the I-280 stub and Fourth Street off-ramp would be removed and the interchange reconfigured to provide on- and off-ramps at King Street near Sixth Street. The Channel Street (sewage) Pump Station would remain beside the freeway ramps.

For more detail on Alternative A, see Volume Two, pp. V.11-13 and Tables V.1-3, pp. V.8-10 and 20-28. See p. V.29 for information on development by 2000 and p. V.29 and Table V.4, p.V.33, for information on the initial phase of development.

Alternative B

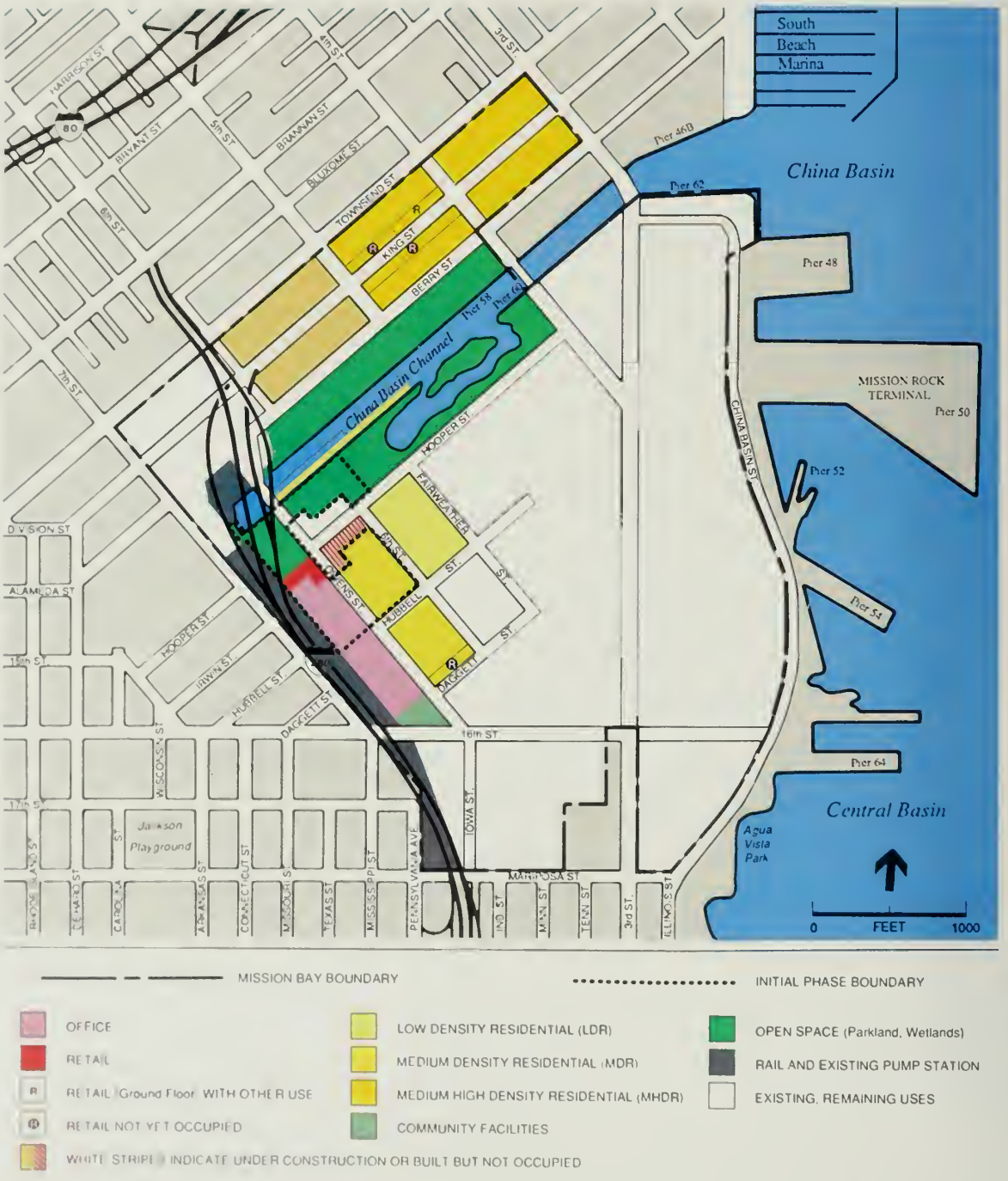
In Alternative B housing would predominate. Commercial space, other than neighborhood-serving retail, would be confined to two locations along the western and southeastern boundaries of the Project Area. Almost one-third of the area would be devoted to public open space, including three wetlands.

With about 10,000 dwelling units, housing would be the primary land use. Office space would be limited to about one million square feet west of Owens Street. S/LI/RD uses would occupy about 420,000 square feet in the southeast corner of the Project Area. About 300,000 square feet of retail space would be north of the channel or west of Third Street south of the channel.

About 5.6 acres would be reserved for community facilities, some of which would replace closed Fire Station 30 east of Third Street. The fire station would be demolished. There would be about 94.1 acres of open space, including the 12-acre China Basin Channel. There would be parks, three wetlands, landscaped areas around the channel, and an open space corridor connecting the central open space west of Third Street with open areas east of Third. The 33.8 acres of wetlands would include public viewing areas and paths around the perimeter. Limited public access would protect wildlife. Pier 62 would be removed to establish the wetland at China Basin.

The 20 houseboat berths and 20 of the existing 35 pleasure craft berths in the channel would

Figure II.9: Mission Bay Building Space at Build-Out. *Alternative A would provide about 15 million square feet of total building space, Alternative B about 10.5 million , and Alternative N about 7.2 million . Alternative A would provide more office and S/LI/RD space than Alternative B, while Alternative B would provide more housing. Alternative N would foster industrial use. Housing is shown in terms of building space for comparison. Alternative A would have about 7,700 dwelling units, and Alternative B about 10,000 . No new housing would be built in Alternative N.*

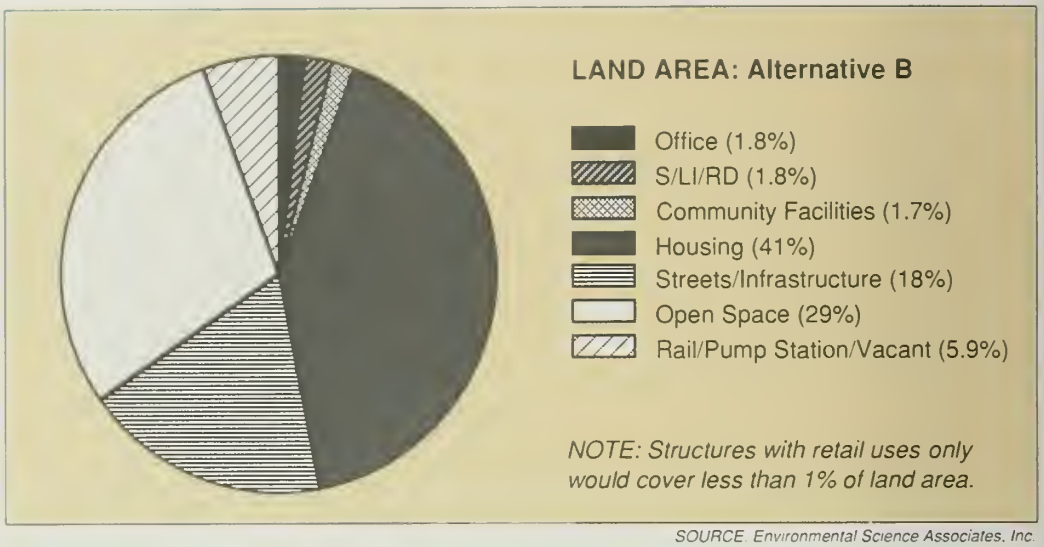


SOURCE: Environmental Science Associates, Inc.

Figure II.10: Alternative B, 2000. *This figure illustrates development under Alternative B by 2000. Also shown is the initial phase of development, expected to begin immediately after project approval with occupancy beginning around 1990. The initial phase would consist of 365,000 square feet of office space, 20,000 square feet of retail space, and 500 medium-density dwelling units.*

SOURCE: Environmental Science Associates, Inc.

Figure II.11: Alternative B, 2020. *At build-out, Alternative B would have about 10,000 housing units, about 30% more than Alternative A. Alternative B would also have more open space, but less commercial space, than Alternative A.*



SOURCE: Environmental Science Associates, Inc.

Figure II.12: Alternative B Land Area by Use at Build-Out. *Like Alternative A, Alternative B is an integrated development program. It includes more housing and open space and less commercial space than Alternative A. (Land uses correspond to the legend starting at the top and moving clockwise around the circle; the percent of land area occupied by each use is shown in parentheses.)*

remain. The channel would not be dredged. As in Alternative A, the CalTrain commute station would be moved to Seventh and Channel Streets. The commuter rail tracks would follow the existing alignment under I-280 from the new station.

The I-280 stub and Fourth Street off-ramp would be removed and the interchange reconfigured to provide on- and off-ramps at King Street near Sixth Street. The Pump Station would remain under the I-280 freeway ramps.

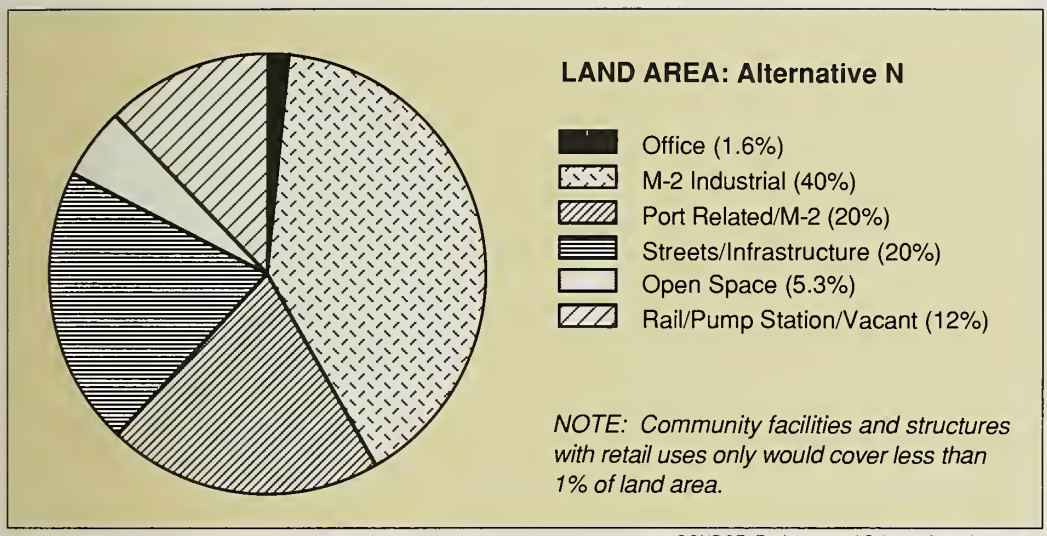
For more detail on Alternative B, see Volume Two, pp. V.13-16 and Tables V.1-3, pp. V.8-10 and 20-28. See p. V.29 for information on development by 2000 and p. V.29 and Table V.4, p. V.33 for information on the initial phase of development.

Alternative N

Alternative N, the No Project Alternative, would develop gradually into a predominantly commercial / industrial area under existing M-2 (Heavy Industrial) zoning. The northernmost block is C-M (Heavy Commercial). A narrow band of P (Public) covers the area south of the channel from Fourth Street west to under the freeway. A triangular area containing about two acres at the southeastern corner of the property is also zoned P (Public). Development under existing zoning and Master Plan policies could take many forms, because there is no integrated development program as assumed for Alternatives A and B. Alternative N represents one likely scenario.

About one million square feet of office space would occupy the block at Third and Townsend Streets. Low-rise structures containing a total of about 100,000 square feet of retail space would be at the southern corner of the Banana Triangle and the intersection of Third and Daggett Streets. Five million square feet of M-2 Industrial space would be developed north of the channel and west of Third Street. It would consist of a mix of light manufacturing, research and development, storage and distribution, small office, and business support and service activities. While similar to S/LI/RD, M-2 Industrial space would be lower density and lower-cost space.

Closed Fire Station 30 at Mission Rock and Third Streets would be retained for community facilities such as fire protection or other public services. The rest of the area east of Third Street would remain in Port-Related/M-2 use. Port-Related/M-2 activities would use low-rise build-


LAND AREA: Alternative N
Office (1.6%)
M-2 Industrial (40%)
Port Related/M-2 (20%)
Streets/Infrastructure (20%)
Open Space (5.3%)
Rail/Pump Station/Vacant (12%)
NOTE: Community facilities and structures with retail uses only would cover less than 1% of land area.

SOURCE: Environmental Science Associates, Inc.

Figure II.13: Alternative N Land Area by Use at Build-Out. *Alternative N, the No Project Alternative, is one likely development scenario under existing zoning and Master Plan policies. Alternative N has more industrial land use than the other Alternatives. (Land uses correspond to the legend starting at the top and moving clockwise around the circle; the percent of land area occupied by each use is shown in parentheses.)*

ings for maritime use, offices, warehouses, and transit and storage sheds, and open land for fenced storage, work areas, and truck and rail yards. About one million square feet of building space and about 41 acres of ancillary land for storage and outdoor activities are included in Alternative N.

Alternative N would include about 17.2 acres of public open space, including the 12-acre China Basin Channel. An open-space strip fronting the south side of the channel would extend from the freeway to Third Street. Another narrow band of public open space would front the north side of the channel. Existing houseboat and pleasure-craft berths in the channel would be retained.

The CalTrain commute station at Fourth and Townsend Streets would not be moved. Land would remain in rail use west of the station, north of King Street, and under the I-280 freeway. Train maintenance operations would continue in the area north of the channel. As with Alternatives A and B, the I-280 stub and Fourth Street off-ramp would be removed and the freeway interchange at Sixth Street reconfigured to provide ramps serving King Street. The Pump Station would remain.

For more detail on Alternative N, see Volume Two, pp. V.16-19 and Tables V.1-3, pp. V. 8-10 and 20-28. See p. V.29 for information on development by 2000.

Employment & Population

The land use programs described above are taken one step further to provide estimates of the number of jobs and residents associated with each Alternative. The numbers quantifying employment and population for each Alternative illustrate reasonable scenarios of types of business activities and households in the Project Area. Those scenarios reflect the land use programs of the Alternatives and characteristics of Mission Bay vis-a-vis other locations in the Downtown & Vicinity. The scenarios also take into account employment and population growth trends and development potentials in the Downtown & Vicinity, the rest of the City, and the rest of the Bay Area.

Future employment in the Project Area depends on the land use programs of the Alternatives. Each Alternative represents different amounts and types of commercial and industrial land use and, consequently, different amounts and types of employment. Employ-

SOURCE Environmental Science Associates, Inc.

Figure II.14: Alternative N, 2000. *This figure illustrates one scenario of development under existing zoning by 2000. No initial phase is assumed for this No Project Alternative because it is not an integrated development program.*

SOURCE: Environmental Science Associates, Inc.

Figure II.15: Alternative N, 2020. *By 2020, most of the land would be devoted to port-related and industrial uses under Alternative N.*

SOURCE: Recht Hausrath & Associates

Figure II.16: Mission Bay Employment at Build-Out.
In Alternative A, office and S/LI/RD jobs would predominate, representing about 14,200 and 8,400 jobs, respectively, out of about 25,000 total jobs. There would be fewer office jobs in Alternative B, but they would still be the major employment category, representing about 3,500 of the 6,000 jobs under Alternative B. M-2 Industrial jobs would be the major employment category under Alternative N, making up about 11,600 of the total 17,000 jobs. Alternative N would also have about 3,500 office jobs.

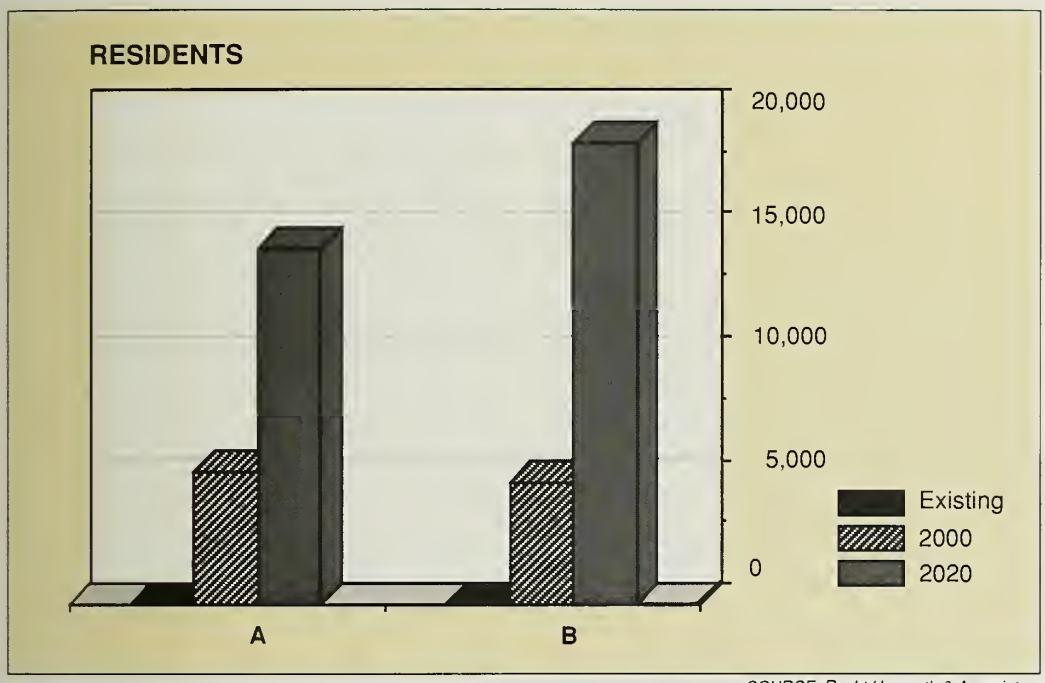
ment density ratios (calculated as gross square feet of building space per worker) were used to convert amounts of space by use in the Project Area to estimates of employment by use. Employment density varies by use, with offices having more workers in a given amount of space than S/LI/RD or M-2 uses, for example. For office and S/LI/RD use, a vacancy rate of 5% is assumed.

Total Mission Bay employment at build-out would vary depending on the Alternative. Alternative A, with the largest amount and variety of commercial space, would have the most employment, about 25,000 jobs, and the greatest variety of types of employment. Alternative N would have about 17,000 jobs, about 70% of the number in Alternative A. Total employment under Alternative B would be relatively small at approximately 6,000 jobs, about 25% of the total for Alternative A. That reflects the relatively small amount of land devoted to commercial development in Alternative B.

The land use programs specify numbers of housing units and densities of residential development for each Alternative. Mission Bay housing would consist of a mix of sizes and types of units. Population estimates are based on household size (persons per household) for various types of residential units. Housing density, size of housing units, and affordability are factors in household size.

By build-out, Mission Bay would be established as a sizable residential neighborhood under Alternative A, with 7,700 new housing units and about 14,000 residents. Alternative B would result in a larger number of households and a larger population in the Project Area, with 10,000 new housing units and approximately 19,000 residents. The houseboat community would remain, making up a part of the larger Mission Bay neighborhood under both Alternatives. The houseboat community would be the only residential use in the Project Area under Alternative N, as it is now. Alternative N does not include new housing development.

For more detail about business activity and employment, see Volume Two, pp. V.33-38 and Table V.6, p. V.35. See pp. V.38-40 for information about housing and population.



SOURCE: Recht Hausrath & Associates

Figure II.17: Mission Bay Resident Population in Alternatives A and B. *The population estimates include new residents as well as the houseboat community that would remain in China Basin Channel. The houseboats would provide the only Mission Bay housing under Alternative N.*

PUBLIC PLANS & POLICIES

This section discusses City and County of San Francisco and Port of San Francisco plans and policies governing Mission Bay development. The key San Francisco policy document for Mission Bay is the Central Waterfront Plan. Alternatives A and B generally do not respond to the plan's objectives for maritime use east of Third Street. Alternative N would enable industrial and maritime-related use to continue. The Central Waterfront Plan calls for a new mixed-use neighborhood west of Third Street, consistent with Alternatives A and B but inconsistent with Alternative N. Port of San Francisco and regional Seaport Plan policies also propose expanded maritime use east of Third Street. Alternatives A and B would not respond to those objectives, but Alternative N would permit port expansion. Alternatives A and B would require amendments to the City Planning Code and zoning maps, while Alternative N would retain existing zoning in the Project Area.

Central Waterfront Plan

The San Francisco Master Plan's Central Waterfront Plan encompasses the Mission Bay Project Area; two subareas of that plan, China Basin and the northern half of Central Basin, roughly follow Mission Bay's boundaries. The Central Waterfront Plan would maintain and expand maritime and industrial activities, complemented by residential, commercial, and recreational uses on surplus land. China Basin subarea objectives specific to Mission Bay call for expanding maritime activity at Piers 48, 50, and 62, adjacent to the Project Area, providing public access along China Basin Channel, and developing a mixed use, predominantly residential neighborhood south of the channel and west of Third Street. Central Basin subarea policies also emphasize port-related use, such as a marine container terminal site east of Third Street and ship repair and general cargo industries.

Alternatives A and B respond to some aspects of the Central Waterfront Plan, but represent a change in public land use policy for portions of Mission Bay and would require amendment of the plan. Alternatives A and B would limit port-related use east of Third Street and would not respond to Central Waterfront Plan policies to expand maritime activities in the China Basin area. Office development proposed in both Alternatives would not respond to plan policies to limit offices to those serving maritime or industrial activities; however, Alternative B would have less office development than Alternative A. Alternatives A and B would respond to policies calling for a mixed-use, predominantly residential neighborhood west of Third Street. Waterfront open space proposed in Alternatives A and B would respond to objectives for the China Basin subarea. Alternatives A and B would require amendment of the Central Waterfront Plan, either through a new Mission Bay subarea plan, revision of the China Basin and Central Basin subarea plans, or creation of a Mission Bay Special Area Plan separate from the Central Waterfront Plan.

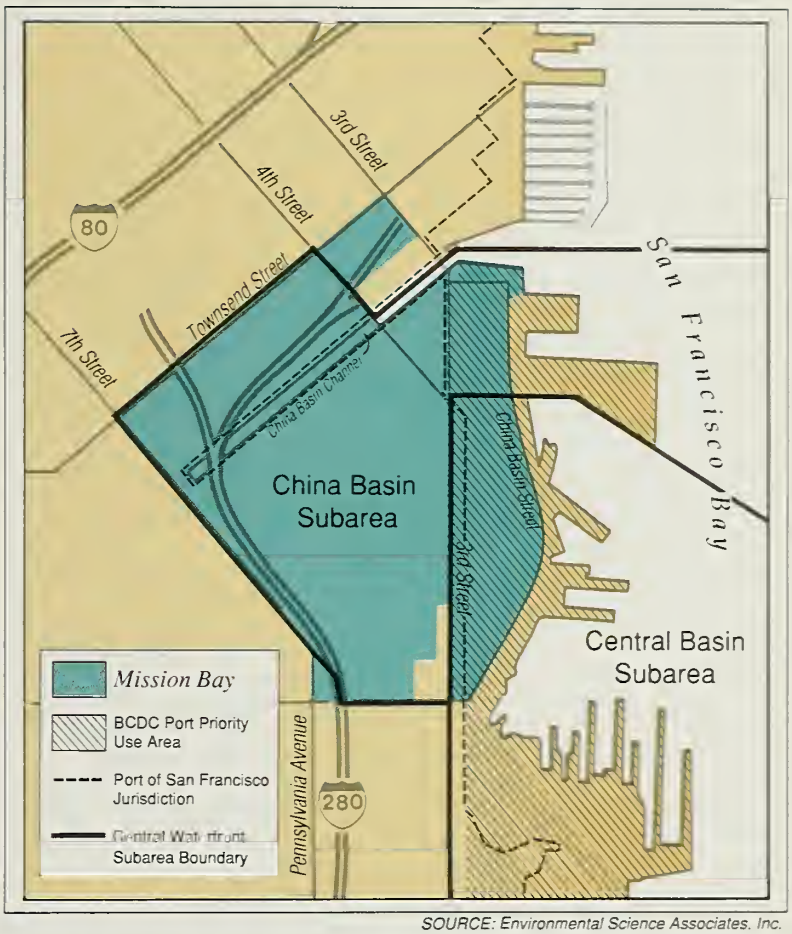
Alternative N would respond to the overall objectives of the Central Waterfront Plan by continuing industrial and maritime-related uses east of Third Street. With the continuation of M-2 (Heavy Industrial) zoning in Alternative N, Mission Bay west of Third Street would probably include industrial, small-scale office, and warehouse uses and would not develop into the mixed-use residential neighborhood called for in the Central Waterfront Plan. Alternative N would not require an amendment to the Central Waterfront Plan or a new Special Area Plan.

For more detail on the Central Waterfront Plan, see Volume Two, pp. VI.A.2-5 and 34-43, and Table VI.A.1, pp. VI.A.35-40.

Port of San Francisco

Reflecting historic transportation and development patterns, most of the Project Area east of Third Street is under the jurisdiction of the Port of San Francisco, a relatively autonomous city agency governed by an appointed Port Commission. In addition to the City's Central Waterfront Plan, the land east of Third Street is subject to port plans and policies. Relevant port plans include the Conceptual Maritime Master Plan for the Southern Waterfront and the regional Seaport Plan. While each plan focuses on different areas of port land at varying levels of detail, they all propose to maintain or expand maritime use east of Third Street in Mission Bay. The Conceptual Maritime Master Plan outlines alternatives for the Mission Rock Container Terminal. Those involve Piers 48 to 64 adjacent to the Project Area, and backland for container movement and storage east of Third Street in the Project Area.

The Seaport Plan, prepared by the Metropolitan Transportation Commission and the San Francisco Bay Conservation and Development Commission (BCDC), evaluates land use and access for future marine terminals in order to maintain the economic vitality of Bay Area ports. As with other port-related plans, the Seaport Plan designates the piers and Project Area east of Third Street for maritime use, and, in particular, identifies Piers 52 to 64 as near-term port development sites. The area east of Third Street is also designated in BCDC's San Francisco Waterfront Special Area Plan as a Port Priority Use Area.



SOURCE: Environmental Science Associates, Inc.

Figure II.18: Central Waterfront Plan Subareas, Port Jurisdiction, and BCDC Port Priority Use Area. *Two of the Central Waterfront Plan's six subareas, China Basin and Central Basin, include policies and objectives specific to Mission Bay development. The Port of San Francisco has jurisdiction over areas east of Third Street; the San Francisco Bay Conservation and Development Commission (BCDC) considers those areas Port Priority Use Areas.*

Alternative A includes mainly open space, residential, S/LI/RD, and Port-related/M-2 uses east of Third Street, precluding development of the Mission Rock Container Terminal. The 6.5 acres adjacent to Piers 50 and 54 designated for maritime use would not provide sufficient backland for a container terminal. Alternative A housing and open space could be incompatible with adjacent port use, making it difficult for the Port to intensify or replace maritime industry near Mission Bay. As a predominately residential community, Alternative B could conflict with adjacent maritime use more than Alternative A, although overall it would be similar to Alternative A. Alternative B would not provide the necessary backland for a container terminal. Alternative N, with no major land use changes east of Third

Street, would permit future container terminal development in the Project Area.

South of the Project Area, both the Port of San Francisco and the Seaport Plan identify the existing container terminal site at Piers 80 to 96 near Islais Creek as suitable for modernization and expansion. As part of the public planning process for Mission Bay, the area between Piers 70 and 80 has been proposed for use as a container terminal. Development of a new container terminal adjacent to the existing terminals could free port land in Mission Bay for non-maritime development. That action would require revision of the Seaport Plan, BCDC designations, and Port jurisdiction east of Third Street.

For more detail on the Port of San Francisco, see Volume Two, pp. VI.A.16-20 and 53-57.

City Planning Code

The City Planning Code is the legal instrument guiding growth and development in San Francisco in accordance with the Master Plan. The City Planning Code, Zoning District Maps, and Height and Bulk District Maps regulate land use and building dimensions. The code authorizes Special Use Districts for areas with unique land use conditions. Most of the Project Area is within an M-2 (Heavy Industrial) Use District, defined as the least restrictive for manufacturing and isolated from residential and commercial areas. Retail, service, wholesale, and office uses are also permitted in M-2 Districts; residential and institutional uses are permitted under certain conditions.

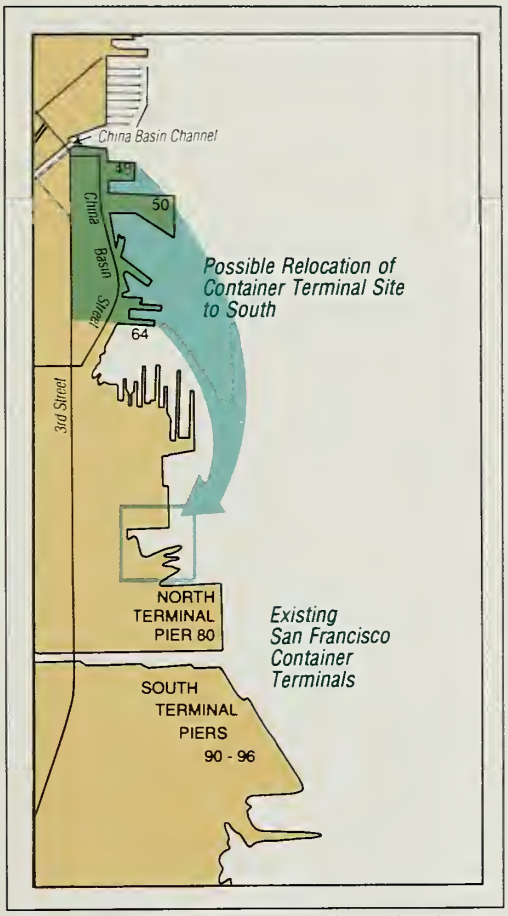
Figure II.19: Port of San Francisco Container Terminal. *San Francisco's container terminal at Piers 80 to 96 near Islais Creek is undergoing expansion and modernization*

SOURCE: Port of San Francisco

Current height limits in Mission Bay range from 40 to 200 feet. Building heights under Alternatives A and B would range from 40 to 110 feet. Buildings up to 200-feet high could be built in the center of the Project Area under the existing Height and Bulk District; however, Alternative N is expected to consist primarily of industrial buildings up to four stories tall.

Alternatives A and B would require zoning map amendments or Special Use Districts, if proposed, to reflect Mission Bay land uses and building heights. In Alternative N, existing zoning controls would remain in effect.

For more detail on the City Planning Code, see Volume Two, pp. VI.A.13-14, 47, and 52-53.

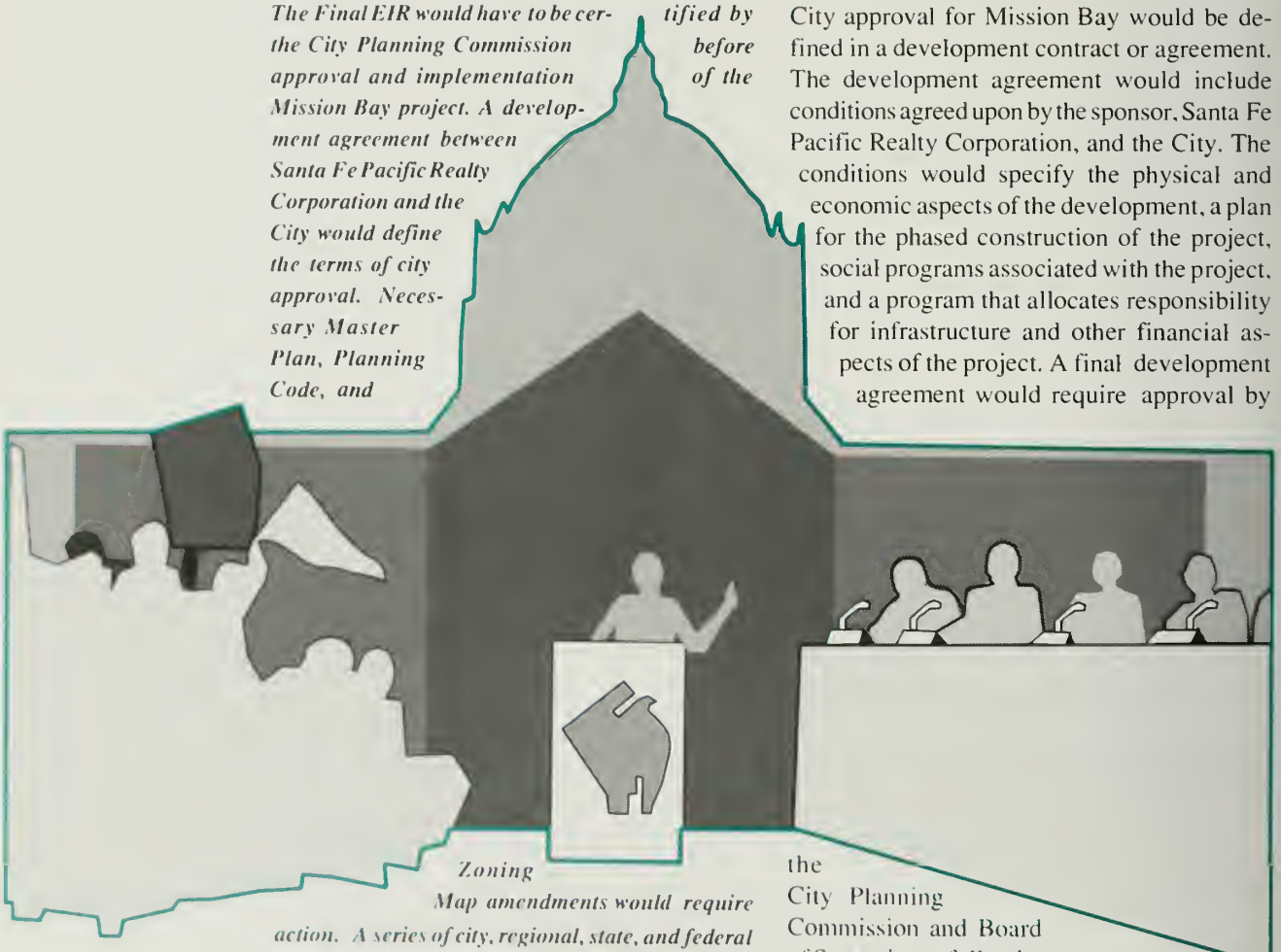


SOURCE: Environmental Science Associates, Inc.

Figure II.20: Possible Relocation of Port Facilities.
Current Port of San Francisco plans to develop the Mission Rock Container Terminal at Piers 48 to 64 would be precluded by Alternatives A and B. However, a proposed land exchange between the project sponsor and Port could allow development of a new container terminal between Piers 70 and 80, adjacent to the existing container terminals.

APPROVAL PROCESS

This section describes the environmental review and approval process for the Mission Bay project. The Final EIR would have to be certified by the City Planning Commission before approval and implementation of the Mission Bay project. A development agreement between Santa Fe Pacific Realty Corporation and the City would define the terms of city approval. Necessary Master Plan, Planning Code, and Zoning Map amendments would require action. A series of city, regional, state, and federal permits and approvals would be required for various aspects of the development.



Environmental Review, Master Plan Amendments, & Rezoning

A public hearing on the Draft EIR will be held before the City Planning Commission, giving citizens a chance to ask questions and voice their concerns about the EIR. A Final EIR containing responses to written and oral comments received and any necessary revisions will be presented to the City Planning Commission for certification. No city approvals for the project can occur until the Final EIR is certified.

City approval for Mission Bay would be defined in a development contract or agreement. The development agreement would include conditions agreed upon by the sponsor, Santa Fe Pacific Realty Corporation, and the City. The conditions would specify the physical and economic aspects of the development, a plan for the phased construction of the project, social programs associated with the project, and a program that allocates responsibility for infrastructure and other financial aspects of the project. A final development agreement would require approval by the City Planning Commission and Board of Supervisors, following separate public hearing and review processes. The development agreement would then be presented to the Mayor for signature.

Along with approval of a development agreement, the Department of City Planning would develop a Subarea Plan or Special Area Plan embodying the preferred plan for the Project Area. The Special Area Plan would require

amendments to the Central Waterfront Plan, Planning Code, and Zoning Map. These amendments would require approval by the City Planning Commission. The Planning Code and Zoning Map amendments would then require enactment as ordinances by the Board of Supervisors, and the Mayor's signature.

The project could qualify as a Specific Plan under the Subdivision Map Act; it would then require Tentative Map Approval. New streets created by the project would be subject to city acceptance. Park lands could be accepted by the Recreation and Park Commission as city property.

In approving Mission Bay, the Planning Commission and Board of Supervisors would evaluate the project against the eight priority policies established by Proposition M, approved by the voters in 1986 and incorporated into the Planning Code. Unless exempted by the voters, Mission Bay would be subject to Proposition M limits on office space approvals.

For more detail on environmental review, Master Plan amendments, and rezoning, see Volume Two, pp. V.40-41.

Other City Permits & Approvals

All Mission Bay Alternatives would require demolition, site, building, and fire safety permits; the project sponsor would file for the applicable permits with the Central Permit Bureau of the Department of Public Works (DPW). With the building permit application, the sponsor would also be required to submit a complete history of the site along with test results from soil samples analyzed for the presence of hazardous materials. The project would also be subject to street vacation and City land acquisition requirements of the Department of Real Estate and DPW; street vacation and land acquisition require approval by the Board of Supervisors. The Department of Public Health would issue food and beverage permits for specific businesses. The Port of San Francisco would have demolition, site, building, and fire safety permit authority over land east of Third Street.

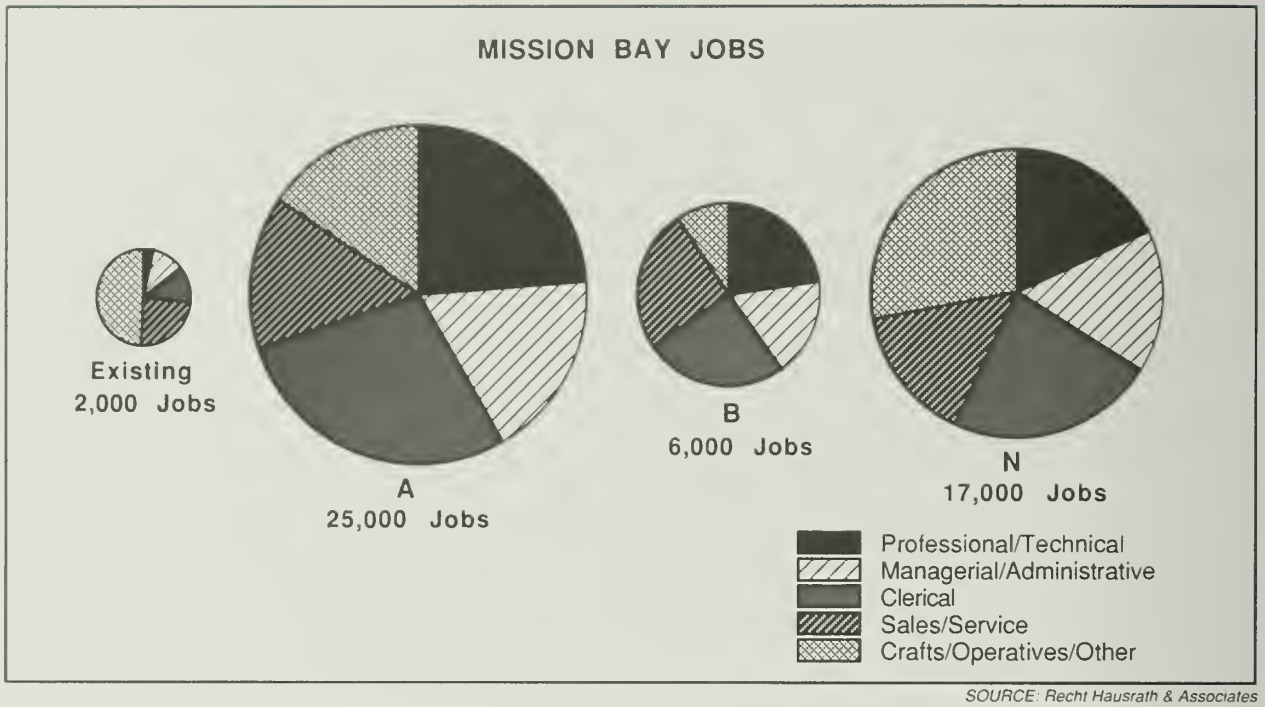
For more detail on other city permits and approvals, see Volume Two, p. V.41, pp. VI.A.15-16, and Table VI.A.3, pp. VI.A.67-68.

Regional, State, & Federal Approvals

The Bay Conservation and Development Commission would require a permit for dredging activities in the channel for Alternative A, and for any development within the 100-foot shoreline band. Alternatives A and B would require revision of the regional Seaport Plan to remove the designation of Piers 48 to 64 as active and near-term marine container terminal sites and to remove the port priority use designation from the area east of Third Street.

The Bay Area Air Quality Management District may require air quality permits for specific uses or tenants in the Project Area; no air quality permits are required for approval of the development agreement. Some uses or tenants may also require water quality permits from the Regional Water Quality Control Board.

Some Project Area land proposed for conveyance to the project sponsor would be subject to the public trust for navigation, commerce, and fisheries under the jurisdiction of the State Lands Commission (SLC) and would be subject to the statutory trust imposed on land granted to the Port of San Francisco. In addition, an exchange of land held in trust by the Port for land owned by the project sponsor and other private entities north of Pier 80 outside the Project Area has been proposed. That or a similar land exchange would be necessary to



SOURCE: Recht Hausrath & Associates

Figure II.21: Mission Bay Jobs by Occupational Category, Existing and Build-Out. *All Alternatives would provide more jobs in the Project Area, although the amount and type of jobs would differ.*

M-2 Industrial and Port-Related businesses in Alternative N would provide more jobs for crafts workers, operatives, and laborers than Alternative A.

Project Area jobs would employ San Francisco residents, as well as residents of other parts of the region. In all Alternatives, about half of the jobs in Mission Bay would be held by city residents, some of whom would both live and work in the Project Area.

For more detail on employment and job opportunities in Mission Bay, see Volume Two, pp. VI.B.83-93.

Business Transition & Displacement

During Mission Bay development, businesses now operating in the Project Area would undergo many changes. The transition would be gradual and would occur even without an integrated development program in the Project Area. The change would be most dramatic in Alternatives A and B; only a few existing or similar businesses might remain in Mission Bay because suitable locations there would be limited. Alternative N would result in the least change in the Project Area. The pace of new development would be slower, so tenants with long-term leases and other businesses with substantial investments in buildings or equipment could remain in the Project Area for as long as it made good business sense. In Alternative N, some distribution, warehousing, and transportation companies could remain as long-term occupants of Mission Bay.

While a few existing Mission Bay businesses might have difficulty finding other locations, most would not, although they might have to pay more for space than they do now. Many would remain in San Francisco, while others would relocate outside the City. Mission Bay companies doing business with other San Francisco firms or serving clients and customers in the City would be those most likely to stay in San Francisco. They could

relocate to older industrial areas south and west of the Project Area.

Maritime-related businesses now in the Project Area could relocate to the waterfront south of Mission Bay, although some might have difficulty finding acceptable locations there. Continued operation of those maritime-related activities in the City could require assistance in relocation.

Some existing businesses in the Project Area, such as materials-processing, construction, storage, auto wrecking, tank cleaning, and waste disposal, require specific equipment or infrastructure, ample storage areas, and, in some cases, rail service or a waterfront location. Such businesses might not be able to duplicate those conditions outside the Project Area. Mission Bay currently provides large amounts of land and the ability to operate what could be considered nuisance activities without interference from neighbors concerned about noise, appearance, and land use compatibility. Relocating those businesses may require special planning because sites comparable to those on which they are now located in Mission Bay are becoming more scarce in the City.

New development would affect some unique uses currently in Mission Bay. In Alternatives A and B, the CalTrain station would be relocated from Fourth and Townsend to Seventh and Channel Streets. CalTrain maintenance operations would be relocated south of Mission Bay. In Alternative N, CalTrain passenger operations would continue as they are now. In all Alternatives, the San Francisco Recreational Vehicle (SFRV) Park would be displaced early in the Mission Bay development process. If the SFRV Park were not relocated elsewhere in the City, visitors would no longer be able to find that type of lodging in San Francisco. Lastly, Alternative B retains only 20 of the 35 existing pleasure-craft berths in China Basin Channel. If not replaced at another marina in the City, there would be fewer berths in Alternative B than in Alternatives A and N, which would retain all 35 berths in Mission Bay.

For more detail on Mission Bay's implications for existing Project Area businesses, see Volume Two, pp. VI.B.93-101.

Maritime Activity

Mission Bay development would affect maritime-related operations in the Project Area and on adjacent piers. Alternative A designates only a small amount of land east of Third Street for port-related use. Alternative B designates none. In Alternative N, the Port-Related/M-2 designation east of Third Street would reserve that area for maritime and other businesses similar to those operating there now.

The housing, open space, and commercial development proposed in Alternatives A and B would not be compatible with active maritime operations in the Project Area or on adjacent piers. Moreover, with a mixed-use or residential community in Mission Bay, the piers would become increasingly valuable for commercial and recreational development. Land uses in Alternative N would not conflict with maritime activity in Mission Bay or on adjacent piers.

For more detail on future maritime activity in the Project Area and on adjacent piers, see Volume Two, pp. VI.B.101-104 and 115-117.

Development In Nearby Areas

Land use, business activity, and employment would change gradually in areas near the Project Area, independent of Mission Bay development. In all Alternatives, Mission Bay and Nearby Areas would attract a wider range of businesses than are currently located there. The effects on Nearby Areas would vary depending

Marine Container Terminal Development

The Project Area east of Third Street would be devoted to housing, open space, and S/LI/RD development under Alternatives A and B. Container terminal development, as proposed in the Seaport Plan, would not be possible. The Seaport Plan would need to be revised. If a land exchange enabling container terminal development between Piers 70 and 80 or other provisions were not arranged, Mission Bay development in Alternatives A and B would reduce future container-handling capacity in San Francisco. With the land east of Third Street designated for port-related use, Alternative N would retain the option for future container terminal expansion adjacent to Mission Bay.

on whether land uses in the Alternatives reinforced or conflicted with land use trends in adjacent areas. The amount of business activity and employment in the Project Area also would affect development pressure in Nearby Areas.

Mission Bay development would affect the pace of growth and change in other locations. Alternative A, with large amounts of office development, would result in less pressure than Alternatives B or N for new offices South of Market, in the South Van Ness area, and along Market Street toward the Civic Center in the C-3 District. With Alternative A, existing service and light industrial businesses could remain longer in those relatively close-in areas, and it would be easier for other rent-sensitive businesses, including small offices, to locate there. Development pressures and associated effects on existing service, light industrial, and other rent-sensitive businesses in close-in areas would not be as great with Alternative N as with Alternative B. The new M-2 Industrial space in Mission Bay under Alternative N would offer locations for activities that otherwise would compete for space outside Mission Bay, thus resulting in less demand and development pressure in those areas than with Alternative B.

Alternatives A and N would reinforce growth of showroom and related activity in Showplace Square, North Potrero, and Potrero Hill. With housing in adjacent parts of the Project Area, Alternative B would probably cause showroom and related activity, as well as small office businesses, to expand further west into the Inner Mission. If such expansion resulted in new construction and higher rents for existing space in the Inner Mission, older businesses and more rent-sensitive uses would locate further south and west.

In areas south of Mission Bay (Lower Potrero/Central Bayfront and South Bayshore), the trend of new businesses rehabilitating low-rent space would accelerate with Alternative A. New commercial development and services in Mission Bay would make adjoining areas increasingly attractive. Because it accommodates less commercial development in the Project Area, Alternative B would result in more competition for space outside Mission Bay than would the other Alternatives. The pace of development in older industrial areas west and south of the Project Area would be faster and more dispersed with Alternative B than with Alternatives A or N. In addition, Alternative B would create more pressure for change because the predominantly residential character would be incompatible with large-scale industrial or maritime operations. Compared to the other Alternatives, Alternative N would have the least effect on the overall pattern of change in older industrial areas near Mission Bay.

All of the Alternatives would provide increased retail shopping and eating and drinking opportunities, expanding the retail options of residents and workers in Nearby Areas. Mission Bay retail establishments, however,

would not have an adverse effect on nearby shopping areas because, in all Alternatives, Mission Bay residents and workers would spend money at retail businesses in other parts of the City. Those sales would outweigh sales made in Mission Bay that otherwise would have gone to merchants in Nearby Areas.

For more detail on business trends in industrial areas near Mission Bay, see Volume Two, pp. VI.B.66-67 and 76-78. See pp. VI.B.106-119 for a comparison of the effects of the Alternatives on development patterns and employment in each area.

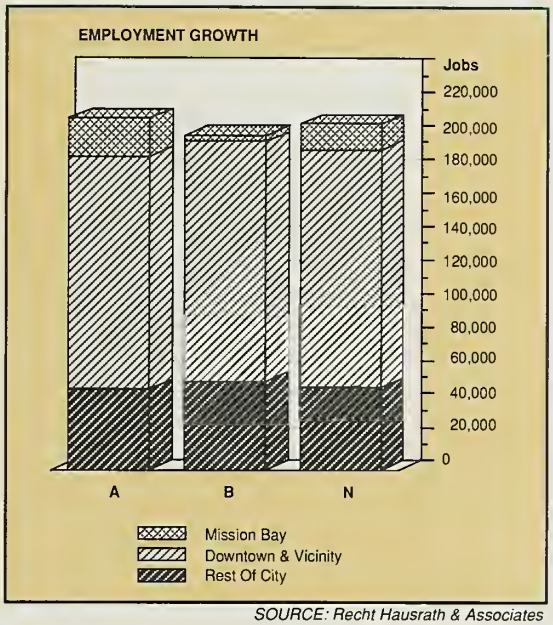
Citywide & Regional Growth

For San Francisco, the Alternatives would have different effects on both the amount and location of development and business activity. For the region, the choice among Alternatives affects where growth would occur, but not the amount of growth expected.

Alternative A would result in the most centralized development pattern. Since more business activity and employment would be concentrated in the Project Area, less activity and development would occur in other parts of the City and region. Alternative A would enhance the City's ability to compete with the suburbs for business activity. Alternative A would result in less change in other parts of San Francisco than would the other Alternatives.

By giving priority to housing, Alternative B would provide fewer options for business activity and employment growth in the Project Area. Compared to the other Alternatives, Alternative B would result in the most growth and development in other parts of the Downtown & Vicinity and in other Nearby Areas, and would result in somewhat more development in other locations in the region.

Citywide and regional development with Alternative N would be more dispersed than with Alternative A and less dispersed than with Alternative B. Alternative N would have less office development and employment in Mission Bay than Alternative A, resulting in more growth in other areas. Compared to Alternative B, Alternative N would provide more locations for services, small office, light-industrial, and maritime-related businesses in Mission Bay, resulting in less change in other industrial areas.



SOURCE: Recht Hausrath & Associates

Figure II.22: San Francisco Employment Growth, Existing to Build-out. *The Mission Bay Alternatives affect the total employment growth expected in San Francisco. With Alternative A, employment would increase the most, by about 210,000 jobs. With Alternative B, employment would increase the least, by about 200,000 jobs. Growth with Alternative N would fall in between, about 207,000 jobs. The figure also illustrates how some of the difference among Alternatives in Project Area employment shifts to other locations in the City. For example, employment growth in the Downtown & Vicinity outside Mission Bay is larger with Alternatives B and N than with Alternative A. Growth in the rest of the City is largest with Alternative B.*

For more detail on the impacts of the Alternatives on development and employment growth in the rest of the City and region, see Volume Two, pp. VI.B.119-123. The forecasts of business activity and employment for the Downtown & Vicinity, the rest of the City, and the region are described in the Future Context section of VI.B. Land Use, Business Activity, and Employment (pp. VI.B.53-79). Those pages include tables presenting the employment forecasts for each of those areas for 2000 and 2020.

Mitigation Measures

Three land use mitigation measures applicable to Alternatives A and B are identified. One addresses relocation assistance for existing Mission Bay businesses. Planning for future container cargo capacity is the second mitigation measure. The third measure deals with the configuration of Mission Bay retail space to provide space for large-scale retail use.

See Volume Two, pp. VI.B.124-125, for land use mitigation measures.

HOUSING & POPULATION

This section describes Project Area housing and population and compares Project Area employment and housing for each Alternative. The effects of the Alternatives on San Francisco's housing market, trends in nearby residential neighborhoods, and the regional housing market are generally discussed. Alternatives A and B would add to the City's housing supply, with new housing exceeding the demand for housing in the City attributable to job growth in Mission Bay. In Alternative N, there would be no housing to offset job growth. Although there would not be much difference among Alternatives in the citywide housing market, there would be some differences for certain segments of the market. In nearby residential areas some features of the Alternatives would add to demand pressures on the housing stock. Those pressures would be offset in Alternatives A and B because Mission Bay housing would absorb some of that demand. There would not be much difference among Alternatives in regional housing market conditions.

Mission Bay Housing

New housing in Mission Bay in Alternatives A and B would be an important addition to the City's housing supply, providing both large numbers of new housing units and a mix of types and sizes of units. Alternatives A and B would provide substantial amounts of housing priced and designed to appeal to a range of household types: singles, unrelated individuals, families with children, single parents with children, and working couples without children. There also would be housing suitable for the elderly and disabled. Households with a variety of incomes would live in Mission Bay. Mission Bay houseboat residents would remain in all Alternatives. Most Mission Bay residents would be employed. Mission Bay housing would attract workers because the location is close to downtown and enjoys relatively easy access, via reverse-commute, to the South Bay and close-in East Bay cities. Most of the workers would be employed in San Francisco, with the majority holding jobs in the Downtown & Vicinity. Some people would both live and work in Mission Bay.

For more detail on Mission Bay households and population, see Volume Two, pp. VI.C.64-67.

Jobs/Housing Balance

In all Alternatives, jobs in Mission Bay would contribute to demand for housing. Alternatives A and B would provide more housing than required to satisfy demand for housing in San Francisco associated with Project Area employment. In Alternative A, there would be about 4,200 surplus units after accounting for the housing needed to accommodate additional San Francisco households associated with Project Area job growth. Since Project Area job growth would be small in Alternative B, only a small portion of its housing would be required to balance job growth, leaving about 9,300 surplus units. Those surpluses under Alternatives A and B would represent housing available to satisfy demand from people working elsewhere in the City or region as well as from households without workers.

In Alternative A, the demand for affordable housing associated with Project Area job growth would exceed the supply of affordable units in Mission Bay. The demand would represent about 36% of the 7,700 units in Alternative A, more than the 30% assumed to be priced at affordable levels. Demand for housing at affordable prices in Alternative B would represent about 6% of the 10,000 units, less than the 30% assumed to be priced at affordable levels. Project Area employment growth in both Alternatives A and B would include workers in households unable to afford the lowest-priced units planned for Mission Bay, contributing to demand for low-priced housing elsewhere in San Francisco.

With no new housing in Alternative N to balance the demand associated with Mission Bay job growth, demand for housing in San Francisco would have to be satisfied in other parts of the City. Some of the demand would be for existing, low-priced housing, some would be for housing within the price range specified as affordable in Alternatives A and B, and some would be for higher-priced housing.

Alternatives A and B include substantially more housing than required by the current Office Affordable Housing Production Program. Because there would be no housing added in Mission Bay under Alternative N, office developers would have to pay in-lieu fees or provide the required housing elsewhere in San Francisco.

For more detail on the relationship between Project Area job growth and housing, see Volume Two, pp. VI.C.67-81.

San Francisco's Housing Market

Commercial development and employment growth in Mission Bay would add to the demand for housing in San Francisco, while Mission Bay residential development would increase the supply of housing. From a citywide perspective, Mission Bay employment and housing would be relatively small components of the cumulative employment growth, housing development, and other factors influencing San Francisco's housing market. That broad combination of factors will determine the overall availability and range of prices and rents for housing in the City in the future. The City's housing market is not expected to change much from that of the mid-1980s, regardless of Mission Bay.

Although there would not be substantial differences in the overall housing market with one Alternative compared to another, there would be some effects evident in certain segments of the City's housing market. Most of the differences would be in the middle range of the market. Compared to Alternative N, with no new housing, Alternatives A and B would result in better housing market conditions by providing subsidized units and units produced at around the threshold price for unsubsidized new housing. That housing would be produced only with the benefit of an integrated development program for Mission Bay, as in Alternatives A and B. That type of housing will continue to be in strong demand and will be difficult to produce elsewhere in the City because of zoning and land cost constraints. Mission Bay would provide housing in San Francisco for people who otherwise would not be able to live in the City. It also would relieve some of the pressure that leads to gentrification of neighborhoods. However, Mission Bay housing would not directly affect the low end of the housing market because the large subsidies needed to provide housing for low-income households are not proposed.

Both Alternatives A and B would result in better citywide housing market conditions than would Alternative N. There would be some difference between Alternatives A and B because Alternative A would contribute more to housing demand and less to housing supply than would Alternative B. Alternative N would contribute to demand for housing but not to supply. More households would compete for new units in the City, increasing demand and bidding up prices. In Alternative N, the City would forgo the opportunity to provide affordable housing in Mission Bay.

For more detail on the effects of the Alternatives on the San Francisco housing market, see Volume Two, pp. VI.C.81-86.

Housing & Population in Nearby Areas

The effects of Mission Bay on nearby residential areas are difficult to predict. Alternatives A and B would accentuate established trends in

SOURCE: Environmental Science Associates, Inc.

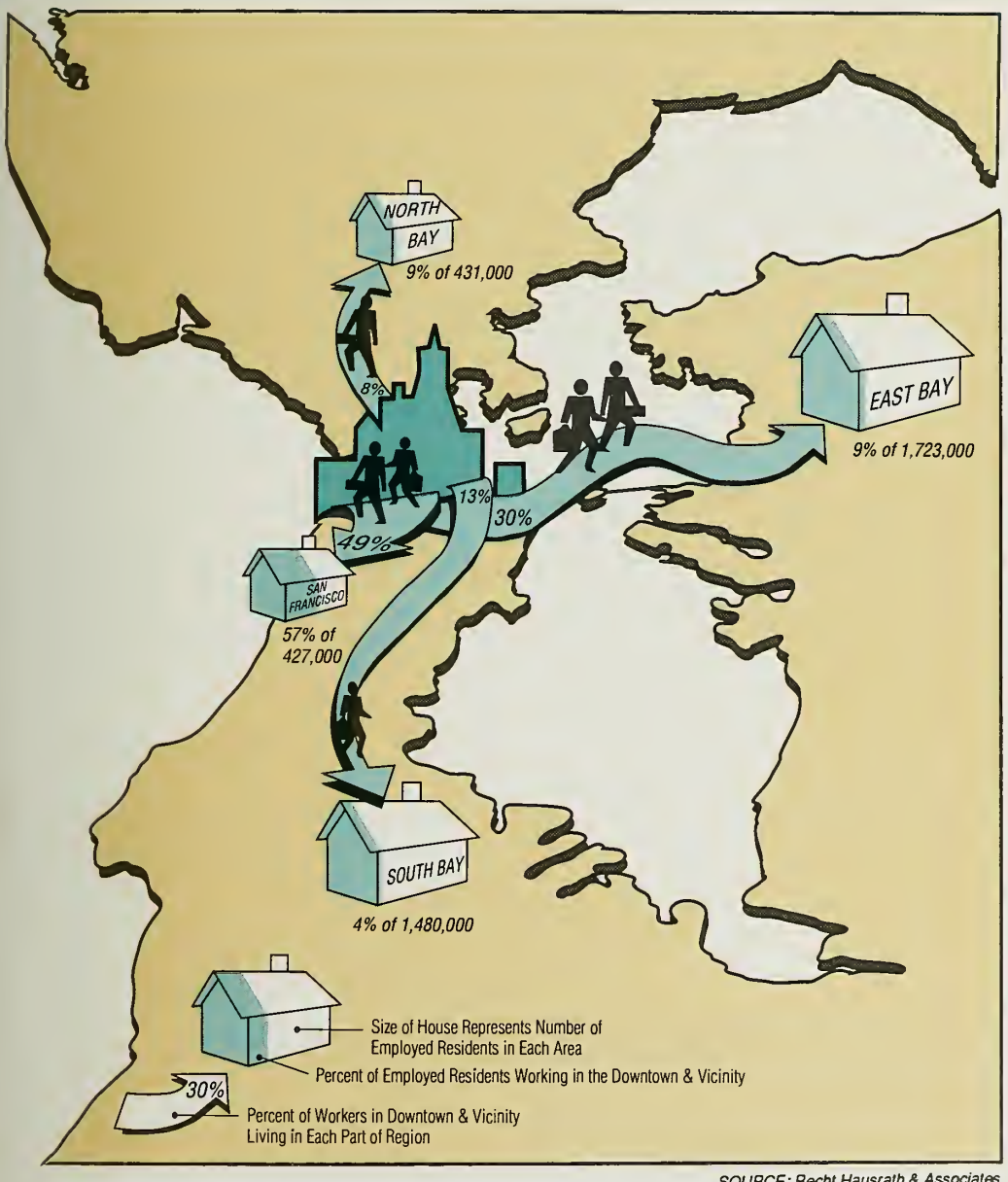
Figure II.23: New Housing at South Beach and Older Housing on Potrero Hill.
Residential areas near Mission Bay will change independent of Mission Bay development. In South of Market, new housing at South Beach (top photo) and Rincon Hill will transform those older commercial and industrial areas as a new residential population becomes established there. Older housing in areas with good access to the Downtown & Vicinity, such as Potrero Hill (bottom photo), will continue to attract people with the resources to renovate.

nearby residential neighborhoods. In those Alternatives, Mission Bay development would enhance the residential character of that part of the City. There would be shopping streets, open space, community and recreation facilities, and improved transportation. Alternative A would also provide new job opportunities. Those development features would contribute to demand for housing in nearby South of Market, Lower Potrero, and Potrero Hill. In neighborhoods with older housing (Potrero Hill, Lower Potrero, and the western South of Market), more gentrification could occur. However, new housing in Alternatives A and B would offset some of the pressure on housing in adjacent neighborhoods, since Mission Bay would absorb some of the demand that otherwise would result in higher prices and rents and gentrification of existing housing.

While Alternative N would provide job opportunities, it would offer no housing and none of the neighborhood features provided in Alternatives A and B. Nevertheless, demand for housing in the Downtown & Vicinity would continue to be strong. With no new housing provided in Mission Bay under Alternative N, housing demand would be greater in other close-in areas, resulting in higher prices and rents for older housing in nearby neighborhoods and new South of Market housing.

Alternatives A and B would increase shopping and recreational opportunities for residents of neighborhoods in the southeastern part of the City, and Alternatives A and N would provide job opportunities. Because of the distance, the Inner Mission and South Bayshore would not be affected substantially by housing demand attributable to Mission Bay development.

For more detail on Mission Bay's implications for nearby residential neighborhoods, see Volume Two, pp. VI.C.86-92



SOURCE: Recht Hausrath & Associates

Figure II.24: Where People Working in the Downtown & Vicinity Would Live, Build-Out. *About half (49%) of the 497,000 people working in the Downtown & Vicinity would live in San Francisco. The rest would live in communities throughout the rest of the region. Those workers living in the City would represent a large share (57%) of the City's employed residents. People working in the Downtown & Vicinity would represent relatively small shares (4-9%) of the employed residents in other parts of the region. This illustrates the degree to which people working in the Downtown & Vicinity would occupy housing throughout the region and, thus, the extent to which they would affect the housing market in each area. The pattern generally applies for all Mission Bay Alternatives in both 2000 and 2020.*

Regional Housing Market

San Francisco employment growth will contribute to housing demand throughout the region, since not all San Francisco workers will live in the City. With housing in Alternatives A and B adding to the City's housing supply, more San Francisco workers could live in the City. San Francisco would thus contribute less to regional housing demand with Alternatives A and B than it would with Alternative N. With Alternative B, San Francisco would contribute the least to housing demand in the region because there would be both more housing and fewer jobs in the City, compared to the scenarios for the other Alternatives.

Although the contribution of San Francisco employment growth to housing demand in the rest of the region would be less with

Alternative B than with either of the other Alternatives, the amount of housing demand associated with the cumulative scenario for total employment growth throughout the region would be about the same with all of the Alternatives. There would be differences in the source of housing demand, however, since the Alternatives would affect development patterns and the distribution of employment growth throughout the region. When San Francisco would contribute relatively less to demand, as with Alternative B, other parts of the region would contribute relatively more.

For all Alternatives, the importance of San Francisco employment as one factor affecting regional housing demand will decline over time because more housing will be added in the City relative to the rate of job growth compared to the situation in the past. As housing and the labor force continue to grow more rapidly outside San Francisco, people working in San Francisco will represent the same or a smaller percentage of the employed people living elsewhere in the region. San Francisco workers will require about the same share of the region's housing in the future as they did in the early 1980s.

San Francisco's effects on the regional housing market would vary among communities. San Francisco workers could become more important to the housing market in some close-in communities in western parts of the East Bay and east of the hills along BART corridors, in northern San Mateo County, and in parts of Marin County.

For more detail on how the Alternatives affect the regional housing market, see Volume Two, pp. VI.C.92-97. See Tables VI.C.14-16, pp. VI.C.56-61, and Volume Three, Appendix L, Tables XIV.L.10-13, for the relatively small variations in residence patterns among Alternatives.

COMMUNITY SERVICES

This section illustrates the effects that Mission Bay would have on the City's fire, police, public schools, and recreation and park services. It also briefly summarizes impacts on libraries, public health, water supply, sewers and wastewater treatment, solid waste, and streets. Mission Bay would use community services and facilities. By build-out, Alternatives A and B would require additional fire and police personnel, equipment, and building space. Alternatives A and B would also need new schools. Alternative N would require fewer community services and facilities. Open space proposed under all Alternatives would meet the demand created by Mission Bay employees, but would fall short of the demand created by residents in Alternatives A and B.

Fire Protection

Development of Mission Bay would increase the number of fire and rescue calls (e.g., resuscitation, first aid, or extraction of trapped persons). Initially, calls in Alternatives A and B could be handled by existing engine and truck companies in Fire Department Battalion 3, but as incidents increased, additional fire companies and stations would be required. At build-out, the Fire Department would receive about 770 fire and rescue calls per year from Mission Bay in Alternative A, 820 in Alternative B, and 120 in Alternative N.

For more detail on fire and rescue incidents and additional resources needed to serve Mission Bay, see Volume Two, pp. VI.D.32-41.

Police Protection

Police incidents in Mission Bay would increase with development. At build-out, the Police Department would respond to about 3,300 incidents per year in Mission Bay in Alternative A, 4,000 in Alternative B, and 900 in Alternative N, representing substantial increases over the current 300 incidents.

To handle the increase in calls, the Police Department would need about 76 additional persons in Alternative A, 81 in Alternative B, and 18 in Alternative N, requiring about 9,100 square feet of new building space in Alternative A, 9,700 square feet in Alternative B, and 2,200 square feet in Alternative N. At build-out, six more squad cars would be needed to serve Mission Bay in Alternatives A and B, while one more car would be needed in Alternative N.

For more detail on police protection, see Volume Two, pp. VI.D.41-48.

Schools

Alternatives A and B would create new residential neighborhoods in Mission Bay, providing housing for families with school-age children. About a quarter of the students living in Mission Bay would attend private schools, but the remainder would be served by the

Figure II.25: San Francisco Fire Engine Company.
At build-out, Alternatives A and B would require one engine company with 15 firefighting personnel and one truck company with 20 firefighting personnel to supplement existing resources. Fire and rescue calls in Alternative N could be handled by existing equipment and personnel.

SOURCE: San Francisco Fire Department

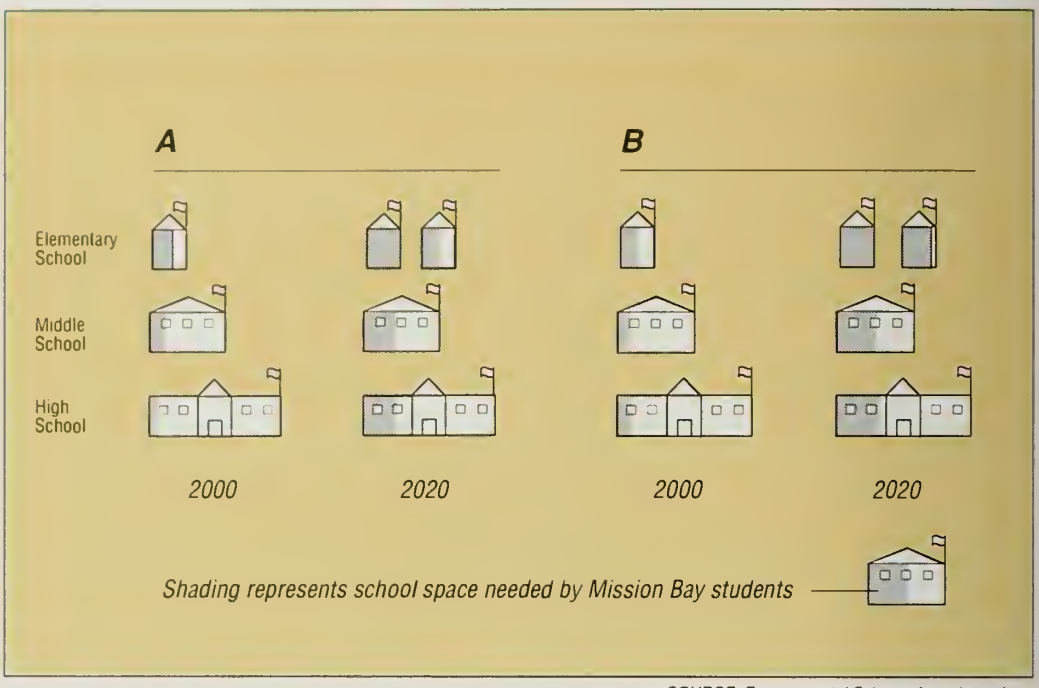


Figure II.26: Public School Space for Mission Bay Students. *In Alternative A, students living in Mission Bay at build-out would need about one and one-half typical elementary schools (K-grade 5), just under half of a middle school (grades 6-8), and one-quarter of a high school (grades 9-12). In Alternative B, students would comprise almost two elementary schools, half of a middle school, and one-third of a high school.*

SOURCE: Environmental Science Associates, Inc.

San Francisco Unified School District. At build-out, about 1,450 public school students would live in the Project Area in Alternative A and about 1,900 would live in the Project Area in Alternative B.

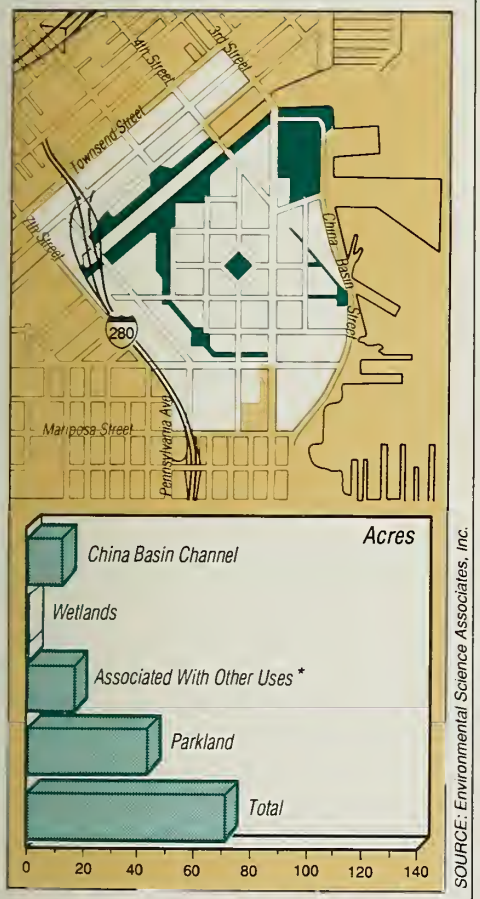
Even without Mission Bay, school enrollment citywide and in Nearby Areas is projected to exceed capacity. The School District would not have classroom space for additional students from Mission Bay. As shown in Figure II.26, Alternatives A and B would require more school facilities. About 90 teachers and staff would be needed for Mission Bay students in Alternative A, and about 116 would be needed in Alternative B. Three public school students projected for Alternative N would be served by existing schools.

For more detail on schools, see Volume Two, pp VII.49-61

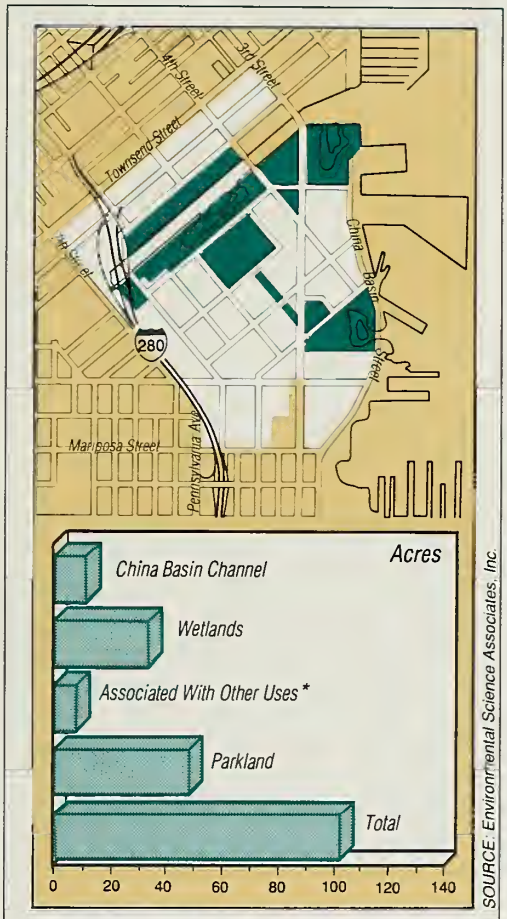
Recreation & Parks

Open space in or near the Project Area currently is limited. Alternatives A and B would provide about 71 and 102 acres, respectively, of open space for residents and employees in Mission Bay, Nearby Areas, and the City. Besides parkland, open space would be provided by China Basin Channel, open space associated with residential and commercial land uses, and, in the case of Alternative B, wetlands. Parkland in Alternatives A and B would provide opportunities for both active recreation, with playing fields or recreation buildings, and passive recreation, with landscaped areas, paths, and tot lots. Alternative N would have about 17 acres of open space, much less than Alternative A or B. About 34 staff people in Alternative A, 40 in Alternative B, and three in Alternative N would be needed to maintain public open space and direct recreation programs.

Project Area residents and employees would have diverse open space and recreational needs. Although quality of open space is often more important than quantity, ideally new development should provide enough open space to satisfy the demand of residents and employees.



*This category includes open space associated with residential, office, and S/LI/RD uses and is not mapped because it would be part of specific building designs.



*This category includes open space associated with residential, office, and S/LI/RD uses and is not mapped because it would be part of specific building designs.

Figure II.27: (left) Alternative A Open Space at Build-Out. *Alternative A would provide about 71 acres of open space. Of the 43 acres of parkland in Alternative A, about 13 acres would be for active recreation and about 30 acres would be for passive recreation.*

Figure II.28: (right) Alternative B Open Space at Build-Out. *Alternative B would provide more open space than Alternative A, about 102 acres versus 71, the difference largely due to the three wetlands in Alternative B. About 22 of the 48 acres of parkland under Alternative B would be for active recreation, while about 26 acres would be for passive recreation.*

At build-out in Alternatives A and B, public open space (parkland and wetlands) would not meet estimated Project Area resident demand for neighborhood and district open space, based on a standard of five acres of open space per 1,000 residents. Alternative A would have the largest shortfall, with demand for about 72 acres of open space and about 43 acres supplied. Under Alternative B there would be a demand for about 93 acres of open space, with about 82 acres provided.

Alternative A would provide about three acres of neighborhood and district open space per 1,000 residents, and Alternative B, about 4.4 acres per 1,000 residents. For comparison, the Marina / Cow Hollow / Pacific Heights area has 3.2 acres per 1,000 residents, and Potrero Hill has 2.1 acres per 1,000 residents.

Open space provided in Alternatives A and B would exceed the estimated Project Area employee demand. The 5.2 acres of public open space in Alternative N would exceed both Project Area resident and employee demand.

For more detail on recreation and parks, see Volume Two, pp. VI.D.61-91.

Figure II.29: Alternative N Open Space at Build-Out. *Alternative N would provide about 17 acres of open space, 12 of which comprise China Basin Channel. All of the 5.2 acres of parkland under Alternative N would be for passive recreation; no active recreation areas are included.*

Other Services

Libraries

Population growth in Mission Bay would increase demand for library services, but would not require a new branch library under any Alternative. Mission Bay residents could patronize the San Francisco Public Library's Potrero Branch and Main Branch at the Civic Center.

Public Health

Some additional ambulance staff and vehicles would be needed to serve Mission Bay. Population and employment growth in the Project Area would also increase the need for other Department of Public Health programs.

Water Supply

The Hetch Hetchy water system supplying the City, and the University Mound Reservoir system serving Mission Bay and surrounding areas, would be adequate to serve all Mission Bay Alternatives.

Sewers & Wastewater Treatment

Sewage from Mission Bay could be accommodated by the Southeast Water Pollution Control Plant. Wet weather overflows into China Basin Channel from the Division Street sewer outfall would continue to occur up to 10 times per year, pursuant to the limits set by the San Francisco Regional Water Quality Control Board. Sewage lines serving new development would be installed as part of street construction.

Solid Waste

Mission Bay's solid waste would not substantially affect San Francisco's capacity at the Altamont Landfill site, although that site is projected to be filled by 2009.

Streets

Streets would be designed and constructed according to Department of Public Works (DPW) specifications. DPW would maintain new city streets. Maintenance requirements for nearby streets outside of the Project Area would increase somewhat with increased traffic from Mission Bay.

For more detail on libraries, see Volume Two, pp. VI.D.86 and 92-93. See pp. VI.D.93-100 for information on ambulance requirements and other health programs. See pp. VI.D.100-103 for information on water supply. See pp. VI.D.104-108 for information on sewers and wastewater treatment. See pp. VI.D.108-111 for information on solid waste. See pp. VI.D.112-114 for information on street design, maintenance, and ownership.

Mitigation Measures

Twenty-three mitigation measures address community service impacts. Seven measures relate to fire protection. For Alternatives A and B they include provision of fire equipment and personnel, a new fire station or rehabilitation of closed Fire Station 30, installation of water cisterns, and provision of a portable water system to compensate for the anticipated disruption of water supply after a major earthquake. Extension of the fire-fighting water supply into the Project Area and measures to maintain emergency services and reduce road and utility damage apply to all Alternatives. Three measures related to police protection for all Alternatives include provision of police facilities and coordination with the Police Department to ensure security is considered in project design. Two measures for schools, applicable to Alternatives A and B, would reserve a school site in Mission Bay and increase capacity in area schools. Four measures related to parks and recreation would provide additional parkland and propose guidelines for recreation and park development in Alternatives A and B, and expand existing Agua Vista Park in Alternative N. Seven measures are listed for public health, water supply, sewer, and solid waste, including water conservation and recycling solid waste.

See Volume Two, pp. VI.D.115-120, for community service mitigation measures.

TRANSPORTATION

This section addresses various transportation impacts associated with the Alternatives in 2000 and 2020; it focuses on conditions during the afternoon commute period. Those impacts pertaining to the Project Area or Nearby Areas are discussed first: traffic congestion at intersections, operation of MUNI routes serving Mission Bay, parking deficits, rail freight access, and pedestrian travel. In most instances, local transportation systems would operate at acceptable levels in 2000. By 2020, roadway and transit improvements and rail reroutings would be necessary.

The transportation impact analyses also evaluate travel generated by Mission Bay in the context of growth in travel projected for the rest of the City and Bay Area. Independent of travel generated by Mission Bay, it is growth in the City and region that would result in the greatest impact on most of the transportation systems studied. Those cumulative impacts are evaluated for freeway and transit systems serving San Francisco and providing connections to the North Bay, East Bay, and South Bay travel corridors. By 2000, congested highway conditions would result in a shift from autos to higher use of transit and ridesharing by travelers from the Downtown & Vicinity. The East Bay would be the most congested corridor, the Peninsula would be the least. By 2020, travel demand would exceed the capacity of regional transportation systems. To serve regional growth, expanded freeway and transit systems would be required.

The Analysis Years

The year 2000 analysis allows an interim "snapshot" of transportation impacts when the Alternatives would be only partially developed. An analysis for that timeframe can rely on reasonably confident estimates of regional transportation capacity improvements, as defined by the region's highway and transit planners.

The longer range future in 2020 is studied because that is the estimated build-out of Mission Bay. Unlike the year 2000, a benchmark year for many planning studies, there are no regional transportation plans or policies that address 2020. While it is reasonable to expect that there will be improvements in regional and city transportation systems between 2000 and 2020, the exact nature of those improvements cannot be known at this time. That means that the analysis for 2020 requires a different approach from the analysis for 2000. Rather than reporting the impacts of future travel on existing or planned transportation systems as is done for 2000, the estimates of 2020 travel conditions are used to identify the types of transportation improvements likely to be necessary to serve the growth in travel between 2000 and 2020.

For both forecast years, 2000 and 2020, the projections of travel used in this EIR assume that many commuters from the Downtown & Vicinity who would otherwise drive would shift to increased use of transit and ridesharing in response to growing highway congestion and the availability of improved transit service. The history of commuting to the Downtown & Vicinity shows that substantial shifts in travel from autos to other modes of travel have occurred when transit and ridesharing systems were improved. The travel forecasting procedures used in this EIR therefore assume that would continue into the future.

For more detail on distinctions between the analysis years, see Volume Two, p. VI.E.52.

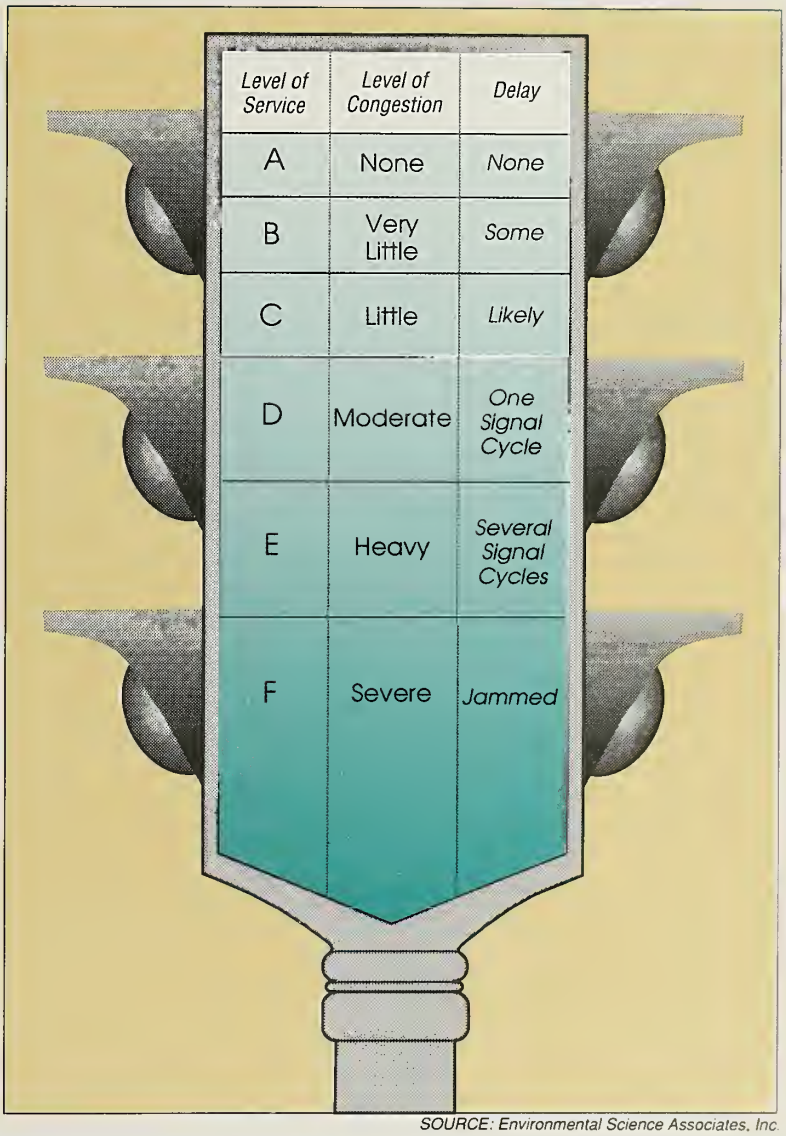
Streets In & Near Mission Bay

The street networks for all Alternatives would be improved under the I-280 Transfer Concept Program (TCP), which includes removal of the I-280 stub between Third and Sixth Streets,

widening and improving King Street, construction of new I-280 on- and off-ramps from King Street, and extension of MUNI Metro light rail service to the CalTrain terminal (at Fourth and Townsend Streets). In Alternatives A and B, MUNI Metro is assumed to extend to the new CalTrain station location at Seventh and Channel Streets.

The combination of the I-280 TCP improvements and new local street networks serving the Project Area would result in slightly less overall congestion on Mission Bay streets in 2000 for all Alternatives as compared to 1985. However, by 2020 congestion on some Mission Bay streets would be greater than existed in 1985. Differences among the Alternatives would be small. Alternatives A and B would be slightly better than N in 2000, while Alternative A would have slightly greater impacts than B or N in 2020 when Mission Bay would be fully built-out.

Most of the streets in the Project Area would operate with limited congestion, Level of Service D or better, with all Alternatives in both 2000 and 2020. The new streets built to serve Mission Bay itself would operate with minimum congestion. Because Mission Bay is on the way to major freeway interchanges and important intra-city streets, however, there would be some points of street congestion where non-Mission Bay traffic must pass through the Project Area. Intersections where there would be congestion in 2000 and 2020 are shown in Figures II.31-II.33.



SOURCE: Environmental Science Associates, Inc.

Figure II.30: Level of Service at Intersections. *The Concept of Level of Service (LOS) is used to measure traffic congestion and delay. As LOS decreases from A to F, traffic operating conditions get worse.*

The point of greatest congestion within Mission Bay in 1985 was the intersection of Third and Berry Streets. That intersection was heavily congested because it served both city traffic on Third Street and traffic destined for downtown via the I-280 freeway. With the I-280 ramps relocated from Berry to King Street as proposed in all Alternatives, the intersection of Third and King Streets would replace Third and Berry as the point of greatest congestion within Mission Bay. The intersection of Third and King would be heavily congested by 2000 with Alternative N and severely congested in all Alternatives by 2020. Most of the traffic passing through this critical intersection would not be destined for Mission Bay, but would be traffic using the I-280 freeway interchange or traffic which needs to pass through Mission Bay on its way to other parts of the City.

A second intersection along four-lane King Street at Fourth Street would also be congested by 2020 with all Alternatives. That congestion would again be caused primarily by traffic not

SOURCE: Barton-Aschman Associates Environmental Science Associates, Inc.

Figure II.31: Intersection Levels of Service During the P.M. Peak Period at Build-Out, Alternative A. The intersection of Third and King Streets is projected to be the most congested. Mitigation measures to widen King Street and add left-turn lanes would improve traffic flows at both Third and Fourth Streets. Similar measures are also available to mitigate congestion at the Third and Mariposa Street intersection.

destined for Mission Bay. A third intersection, Third Street at Mariposa Street, would be heavily congested by 2020 with Alternative A. That intersection would be less congested with Alternatives B and N than with Alternative A. There would be no other intersections operating below Level of Service D within the Project Area in 2020.

Congestion projected for King Street and its intersections in the Project Area could be mitigated with a six-lane roadway, with parking permitted only at off-peak hours. With a double left-turn lane at Third Street, and a single left-turn lane at Fourth Street, King Street would operate at Level of Service D or better with all Alternatives in 2020. To mitigate congestion projected for Third and Mariposa Streets, that intersection could be widened to allow double southbound right-turn lanes on Third and a separate eastbound left-turn lane on Mariposa.

Severe congestion would continue to occur in both 2000 and 2020 on several of the James

SOURCE: Barton-Aschman Associates / Environmental Science Associates, Inc.

Figure II.32: Intersection Levels of Service During the P.M. Peak Period at Build-Out, Alternative B. *Mitigation measures identified for Alternative A to address congested intersections on King Street at Third and Fourth Streets would also apply to Alternative B. However, no change would be required for the intersection at Third and Mariposa Streets.*

Lick (I-80) freeway approaches in the South of Market area near Mission Bay. Those streets and freeway ramps serve traffic destined for the Bay Bridge and Peninsula. Several of those streets are heavily congested now. The number of severely congested I-80 approach intersections would increase by 2000 and increase again by 2020, whether or not Mission Bay is developed.

Differences among Alternatives are very small within the Project Area, and even smaller at the approaches to the regional highway system. That is because the share of total traffic generated by Mission Bay at those intersections would be small with all Alternatives. Mission Bay would account for less than 5% of total traffic at the freeway approaches and never more than 15% of total traffic on the major through routes within the Project Area.

For more detail on intersection operation, see Volume Two, pp. VI.E.2-13, 140-148, 166-175, 199-201, and 218-219.

SOURCE: Barton-Aschman Associates / Environmental Science Associates, Inc.

Figure II.33: Intersection Levels of Service During the P.M. Peak Period at Build-Out, Alternative N. *Mitigation measures identified for Alternative A to address congested intersections on King Street at Third and Fourth Streets would also apply to Alternative N. As with Alternative B, no change would be required for the intersection at Third and Mariposa Streets.*

Transit in Mission Bay & Nearby Areas

For the local street system to operate as described above, there would have to be a high level of public transit use between Mission Bay and the rest of the City. In 1985, about 55% of all afternoon peak-hour outbound trips from the Downtown & Vicinity were on transit. That level of transit could grow to about 70% of all trips, based on the increased capacity of transit systems expected to be available by 2000. Transit serving Mission Bay must be very convenient and direct, and at about the same level as for the rest of the Downtown & Vicinity, if the Levels of Service described above are to be achieved.

MUNI Service

In addition to the extension of MUNI Metro, MUNI bus service into the Project Area would be increased with Alternatives A and B. The 30-Stockton, 47-Van Ness, 22-Fillmore, and 81X-Sansome Battery Express would be extended or rerouted to serve Mission Bay; the 15-Third would retain the same route configuration. Alternative B would result in the heaviest flows of people toward Mission Bay on MUNI in the afternoon peak hours and the greatest impact on MUNI. That would occur because Alternative B would have more housing than the other Alternatives, and those residences would be the destination of workers traveling home in the afternoon peak hours. That travel toward Mission Bay from the downtown (in the peak outbound direction) would add to southbound travel by workers leaving downtown jobs to get to homes in other parts of the City.

Alternatives A and N would have more jobs than Alternative B, so their heaviest MUNI demand would be away from Mission Bay in the afternoon peak hours. Some of those MUNI trips from the Project Area would be in the non-peak direction (towards downtown).

The increased route and service capacity on MUNI, as proposed in each of the Alternatives, would generally be able to accommodate projected transit demand in 2000. Just one route, the 47-Van Ness connecting the Project Area with the Civic Center area, would operate at more than 25% over seated capacity with Alternatives A and B in 2000, and thus would require a further increase in capacity to meet MUNI's load factor standard.

The 2020 travel demand for MUNI service generated by the Project Area would exceed the capacity of several of the lines serving Mission Bay. With Alternative B all five lines would be more than 25% over seated peak-hour capacity in 2020; four in Alternative A and three in Alternative N would be more than 25% over seated peak-hour capacity. The MUNI Metro would operate with excess capacity in all of the Alternatives. To mitigate the impact of excess travel demand for MUNI services and to assure as high a level of transit service to the Project Area as possible, the following measures could be implemented:

- MUNI service increases on all routes projected to be overcrowded in 2020, and replacement of Route 47-Van Ness service with a new Metro or streetcar line connecting the Project Area with the Van Ness Corridor.

- Preferential bus lanes on certain streets, and large and efficient passenger loading areas to minimize MUNI schedule interruptions.

For more detail on transit service on MUNI routes proposed to serve the Project Area, see Volume Two, pp. VI.E.14-18, 148-152, 175-178, 201-202, and 219-220.

CalTrain Station Location

The Mission Bay Alternatives would affect the ridership served by CalTrain. Relocation of the CalTrain terminal to Seventh and Channel Streets, proposed in Alternatives A and B, would reduce the potential use of CalTrain, compared to the ridership possible with the CalTrain station remaining at Fourth and Townsend Streets as proposed in Alternative N.

The potential difference in future ridership caused by relocation of the CalTrain terminal has been estimated in various studies to be between 5% and 22%. The greatest impact, a 22% reduction in future ridership, has been assumed in this analysis because it would result in the most conservative condition for the roadway and freeway system. The greater the loss in

mobiles, resulting in increased street congestion. That increase in automobiles would correspond with more empty seats on CalTrain.

To mitigate the loss in ridership due to relocation of the CalTrain Station in Alternatives A and B, CalTrain service could be extended underground to Fourth and Townsend or King Streets via construction of a tunnel. Construction of that tunnel should be coordinated with the I-280 improvements to minimize traffic disruption and construction costs. Refer to the section on Variations on Alternatives in this chapter for additional discussion of the location of the CalTrain station.

Increased MUNI bus service operating on preferential lanes to the CalTrain station at Seventh and Channel Streets could also mitigate the loss of CalTrain ridership. The service would have to be provided at increased frequencies and possibly on new routes to provide travel times to destinations in the downtown core and South of Market areas equal to travel times from the Fourth and Townsend CalTrain station.

For more detail on CalTrain service, see Volume Two, pp. VI.E.36-37, 45-46, 61-62, 84, 94-98, 101-104, 115-123, 127-133, 191-193, 202-204, and VII.51-54.

Parking In & Near Mission Bay

The parking impact analysis evaluates parking demand in the Project Area over the course of a full day. That is because a higher proportion of trips would be made by car at times other than the p.m. peak period. Parking supply ratios were assumed for each proposed land use. Generally, non-residential uses would provide one space per 1,000 square feet of floor area; residential parking was assumed to be one space per dwelling unit.

By 2000, the ratio of parking demand to supply in Alternatives A and B would result in small parking deficits (about 150 spaces). The excess cars could be accommodated in parking lots on undeveloped sites. By 2020, however, the parking deficits would be greater, almost 1,000 spaces in Alternative A and almost 300 spaces in Alternative B. Competition for parking, particularly under Alternative A, would spill over into residential sections of the Project Area. There also would be competition for parking between Mission Bay and nearby Showplace Square and South of Market areas. Alternative N would result in a surplus of parking in 2000 and at build-out.

Mitigation measures include increases in local and regional transit service to and from the Project Area during the non-peak period. That would reduce the number of trips made by car. Given the overall increased congestion projected for 2020, increased transit should be favored over provision of additional parking.

For more detail on parking impacts, see Volume Two, pp. VI.E.29-31, 70, 158-164, 184-187, 207-209, and 222-223.

Rail Freight Facilities & Services

Rail tracks through the Project Area provide rail freight service to the Northern Waterfront via the Belt Railroad, and south to the Pier 80-96 container terminals at Islais Creek via the ATSF (Santa Fe) Illinois Street rail lead. Connections to both of those tracks are provided from the Southern Pacific (SP) mainline that runs along the western side of the Project Area, the same set of tracks used to provide CalTrain passenger service.

By 2000, implementation of the I-280 improvements under all Alternatives, and relocation of the CalTrain station under Alternatives A

and B, would require abandonment of tracks providing existing Belt Railroad service. That service could be maintained by new tracks along China Basin Street, crossing China Basin Channel via the Lefty O'Doul (Third Street) Bridge, and connecting with the existing tracks on The Embarcadero north of the Channel. This rerouting would require connection to the SP mainline south of the Project Area.

The build-out of Alternatives A and B in 2020 would require abandonment of the connection between the SP mainline and the Illinois Street tracks via the 16th Street lead, which provides rail access to the northern container terminal at Islais Creek. One approach to replacing that connection is south of the Project Area via the Indiana Street lead tracks. The Indiana lead would access tracks on 25th Street, which would connect with an Illinois Street track that serves the container terminal. A second option would be to construct a new lead track from the mainline under I-280 to connect with former Western Pacific tracks on Army Street that access the container terminal. Another (more costly) option would be for the Port of San Francisco to construct a rail bridge across Islais Creek to connect the Illinois Street tracks to the mainline, as well as provide a connection between the Central and Southern Waterfront areas.

The existing lead tracks serving other businesses west and south of the Project Area, on 16th Street west of the mainline and on Harrison, Florida, and Indiana Streets, could all be maintained.

For more detail on rail freight service, see Volume Two, pp. VI.E.20-27, 67-70, 152-158, 178-184, 205-206, and 221-222.

Pedestrians & Bicycles

Pedestrian and bicycle activity in 2000 and 2020 would increase from existing levels in all Alternatives. The CalTrain Station was the only point of intense pedestrian activity in the Project Area in 1985, and would continue to generate substantial pedestrian trips at build-out. Growth in pedestrian activity in the Project Area would be directly related to the type and intensity of land use in each part of the Project Area.

Growth in bicycle use would be linked to increased population in Mission Bay and to job growth in both Mission Bay and the downtown areas. Sidewalks and bicycle routes are proposed in all Alternatives to accommodate expected increases in pedestrian and bicycle use. Designated bicycle routes are proposed on 16th Street in all Alternatives and on Berry Street in Alternatives A and B.

For more detail on pedestrian and bicycle impacts, see Volume Two, pp. VI.E.27-29, 164-166, 187, and 209-210.

Regional Travel

Regional travel was analyzed for each of the three major approaches to San Francisco: the North Bay via the Golden Gate Bridge, the East Bay via the San Francisco-Oakland Bay Bridge, and the Peninsula via the U.S. 101 and I-280 freeways. Travel forecasts take into account the capacity projected to be available on the major regional highway and transit systems in the future. Reliable projections of highway and transit system capacity are available for 2000, but have not been developed by regional agencies for 2020. The analysis for 2000 is based on comparing the projected demand for transportation service with the capacities expected to be available. The analysis for 2020 uses the transportation system capacities developed for 2000 as a base, and identifies additional capacity above the 2000 level that would be needed to serve the travel demands of 2020.

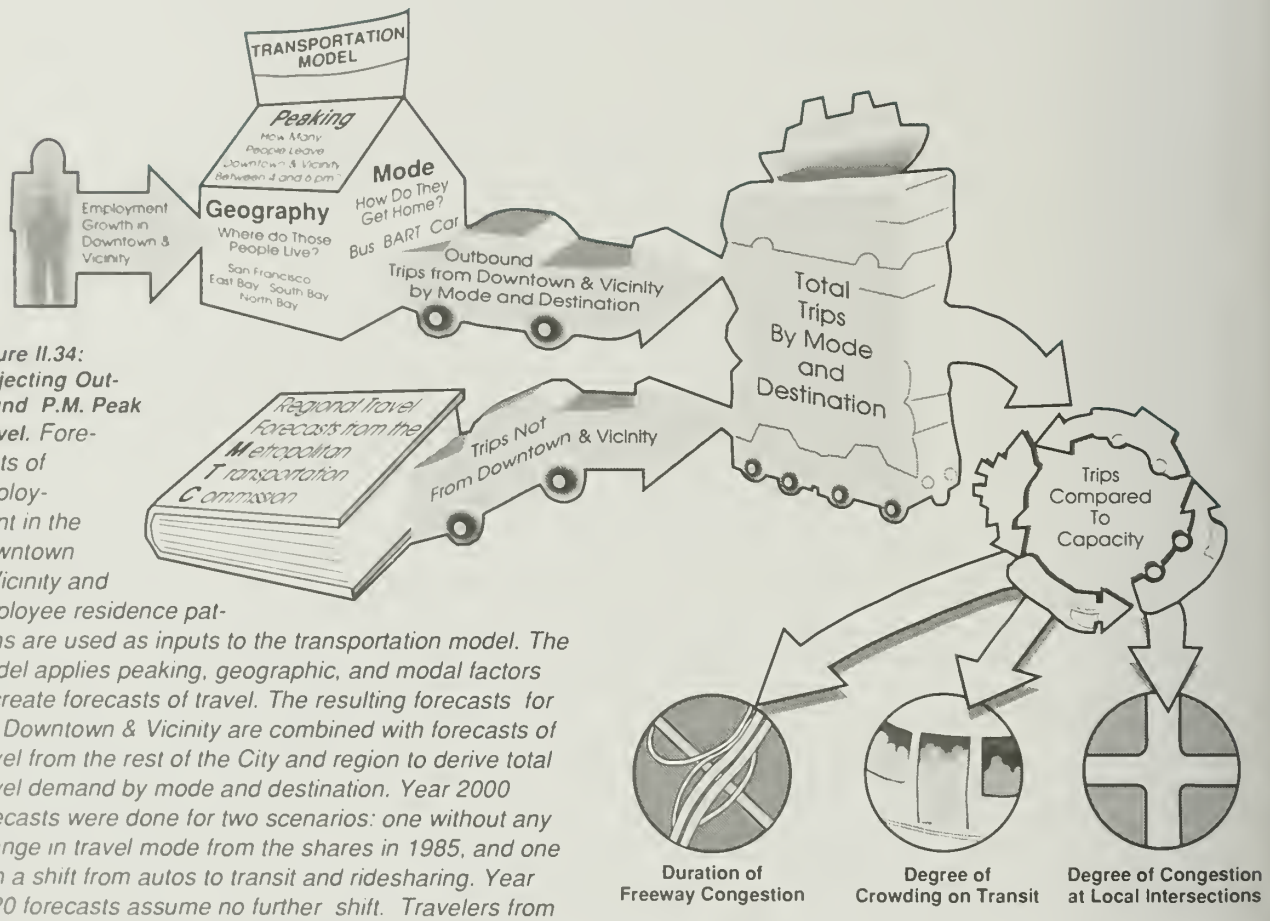

TRANSPORTATION MODEL
Peaking
How Many People Leave Downtown & Vicinity Between 4 and 6 pm?
Mode
How Do They Get Home?
Bus BART Car
Geography
Where do Those People Live?
San Francisco East Bay South Bay North Bay
Employment Growth in Downtown & Vicinity
Outbound Trips from Downtown & Vicinity by Mode and Destination
Total Trips By Mode and Destination
Regional Travel Forecasts from the Metropolitan Transportation Commission
Trips Not From Downtown & Vicinity
Trips Compared To Capacity
Duration of Freeway Congestion
Degree of Crowding on Transit
Degree of Congestion at Local Intersections

Figure II.34: Projecting Outbound P.M. Peak Travel. *Forecasts of employment in the Downtown & Vicinity and employee residence patterns are used as inputs to the transportation model. The model applies peaking, geographic, and modal factors to create forecasts of travel. The resulting forecasts for the Downtown & Vicinity are combined with forecasts of travel from the rest of the City and region to derive total travel demand by mode and destination. Year 2000 forecasts were done for two scenarios: one without any change in travel mode from the shares in 1985, and one with a shift from autos to transit and ridesharing. Year 2020 forecasts assume no further shift. Travelers from outside the Downtown & Vicinity are not projected to change their modes of travel from the 1985 shares.*

SOURCE: Barton Aschman Associates / Environmental Science Associates, Inc

The regional travel forecasts assume that where severe congestion is projected for the highway system and where parallel transit and ridesharing systems are available, travelers would choose to shift from their autos to fill the capacity available in transit and ridesharing systems. Those shifts are assumed to be made by travelers from the Downtown & Vicinity only, because they would have more transit and ridesharing options than travelers from other parts of the City or region. The shift to transit and ridesharing would be greatest for travel to the East Bay, somewhat less to the North Bay, and none would be necessary for travelers to the Peninsula by 2000.

Congestion on routes connecting San Francisco with the rest of the Bay Area would grow by 2000, and even more by 2020, whether or not Mission Bay were developed. Growth in the Downtown & Vicinity and the rest of the region would be the primary source of travelers trying to cross the Golden Gate and Bay Bridges and use the U.S. 101 and I-280 freeways at peak hours.

For more detail on the travel forecasting process and transportation capacity increases assumed in the analysis, see Volume Two, pp. VI.E.31-34, 50-52, 56-83, and 211-214.

Downtown & Vicinity - Muni

To analyze cumulative impacts on MUNI, individual MUNI routes were grouped on the basis of the location of their alignments and stops into the "Northeast," "Northwest," "Southwest," and "Southeast" areas of San Francisco, referred to as "screenlines." By 2000, ridership would generally be accommodated on the MUNI screenlines; slight overcrowding would occur on the Northwest screenline during the p.m. peak hour, and on the Northeast screenline during the p.m. peak period. However, by 2020, all but the Southwest screenline would be operating beyond MUNI's load standard. Additional service required could include new light rail service to the Geary Boulevard corridor to the Northwest and to the Bayshore corridor in the Southeast area of the City.

For more detail on cumulative ridership impacts at the MUNI screenlines, see Volume Two, pp. VI.E.31-36, 62-67, 79, 93-99, 103-104, 115-124, 217, and 231.

North Bay Corridor

The Golden Gate Bridge and its approaches operated with moderate congestion (driving speeds of about 35 to 45 mph) in peak hours in 1985. By 2000, heavy congestion on the bridge (a driving speed of about 30 mph) would last about two hours if additional transit capacity between downtown and the North Bay were provided, and a substantial shift from autos to transit and ridesharing were made by travelers from the Downtown & Vicinity. If no shift from 1985 transit use levels were to occur, the period of heavy congestion on the Bridge would last for about four hours in 2000.

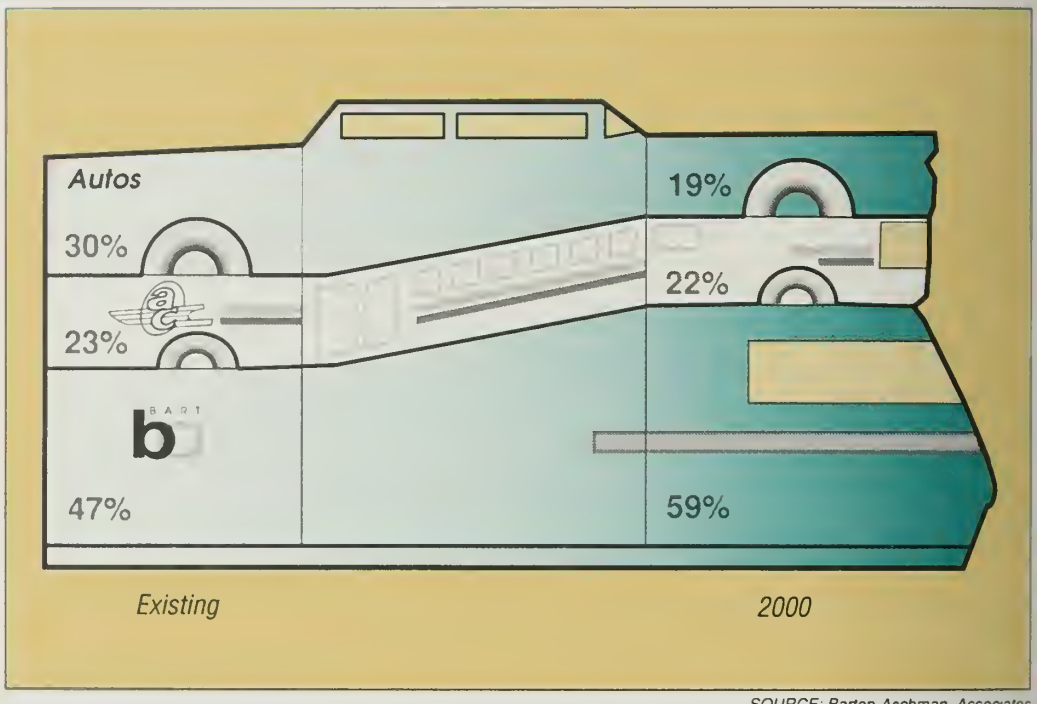
Golden Gate Transit indicates that it would be able to increase its bus and ferry capacity between downtown and the North Bay by 2000 in response to the demand generated. Golden Gate Bus ridership would about double and ferry ridership would grow by about 60% from 1985 to 2000. Buses would be more crowded in the future than they were in 1985, requiring some additional increases in service to meet Golden Gate bus loading standards. Ridesharing is projected to increase by 15% between 1985 and 2000 in the North Bay. Shifts of commuters from autos to transit and ridesharing may not occur if improved levels of transit and ridesharing services are not provided by 2000.

To mitigate the impacts described for the Golden Gate Bridge in 2000 and further facilitate the use of public transit, bus/carpool lanes should be designated on Lombard Street and Doyle Drive, the San Francisco approaches to the Bridge.

By the year 2020, heavy congestion on the Golden Gate Bridge could last four hours, assuming the levels of transit and ridesharing used in 2000, if there were no additional transportation improvements between 2000 and 2020. By that time, the need to consider major new transportation infrastructure and transit systems will have become apparent. Improvements should provide very convenient and attractive alternatives to auto travel, because by 2000 the majority of travelers from the Downtown & Vicinity would already be traveling by transit or ridesharing.

That next phase of regional transportation planning could consider adding a second deck to the Golden Gate Bridge to provide transbay capacity for new bus and carpool lanes, or a light-rail line, either of which would extend between downtown San Francisco and Sonoma County.

For more detail on future travel conditions to the North Bay, see Volume Two, pp. VI.E.31-34, 39, 41, 71-78, 80-82, 84-89, 94-100, 103-111, 114-125, 129-137, 214-215, and 225-226.



SOURCE: Barton-Aschman Associates

Figure II.35: Modal Shift. *This figure shows the modal shares of travelers from the Downtown & Vicinity to the East Bay during the afternoon commute period for existing conditions and 2000. Because congestion on freeways serving San Francisco is projected to increase, a greater proportion of commuters leaving the Downtown & Vicinity for the East Bay will have to take transit or share rides. As BART would accommodate most of the shift to transit, AC Transit would carry about the same share of travelers as it does now. The proportion of commuters traveling by auto would decrease, and the average number of occupants per vehicle would increase.*

East Bay Corridor

The San Francisco approaches to the Bay Bridge operated at capacity, with travel speeds of about 30 mph, for almost two hours in the afternoon peak period in 1985. There is virtually no room for additional vehicle traffic on the eastbound bridge approaches between 4:00 p.m. and 6:00 p.m.

While the growth in travel demand on the Bay Bridge from the Downtown & Vicinity could be served by shifting commuters from autos to transit and increasing ridesharing, trips to or from other areas of the region are not well served by transit and would continue to be made primarily in private vehicles.

Even with the substantial shift to transit and ridesharing assumed in the analysis, the Bay Bridge would operate at capacity for about 4.5 hours in 2000, resulting in severe congestion on the San Francisco approaches to the bridge, travel speeds of less than 30 miles per hour, and heavy congestion on the bridge itself every weekday afternoon.

The small amount of available capacity would handle about 20% of the projected growth in regional travelers during the peak period. Under those circumstances, drivers (primarily from outside the Downtown & Vicinity) would likely try different travel routes and travel times. People would also try to move closer to their place of work or change jobs to reduce their commute. It is also possible that the duration of congestion could inhibit economic growth below the level forecast in the EIR. Were the shift to transit and ridesharing from 1985 levels not to occur, the period of severe congestion in 2000 would extend for over 5.5 hours.

By 2000, the numbers and proportion of commuters from the Downtown & Vicinity on BART during the p.m. peak period would be substantially higher. The capacity planned for BART in 2000 would allow for about a doubling in the number of BART riders from the

Bridge in 2020 would also be severely congested for more than two hours every weekday afternoon, many potential travelers would most available and the need to accommodate some BART riders by 2000. However, due to the limited increase in capacity assumed in the analysis, the proportion of trips on AC Transit would decrease slightly between 1985 and 2000.

The increased use of BART and AC Transit would mean a substantial increase in crowding on the trains and buses. The ratio of passengers to seats on BART would increase from 1.30 in 1985 to 1.63 in 2000. AC Transit loads would increase from 0.85 passengers per seat in 1985 to 1.30 in 2000. Additional service would be required for both BART and AC Transit to attain their respective loading standards of 1.5 and 1.25 passengers per seat.

The capacity of BART is based on the maximum capacity of BART's computer system to track trains in the transbay tube. The crowding projected for BART could not be fully mitigated during the peak period because of the system's technical operating limits. Crowding on AC Transit could be mitigated by increasing the number of buses serving downtown; even further increases would be needed to reduce crowding on BART.

An increase of 7% in ridesharing from the Downtown & Vicinity across the Bay Bridge is projected for 2000. That increase is based on completion of the bus and carpool lane facilities planned for Interstates 80 and 580, and on the severe congestion projected for the Bay Bridge by 2000.

Even with substantial shifts to transit and ridesharing by commuters from the Downtown & Vicinity, by 2020 severe congestion on the Bay Bridge and its approaches would last for over five hours. The number of regional vehicle trips which could not be served by the Bay Bridge would grow from about 3,000 peak-period vehicles in 2000 to between 5,500 and 5,800 in 2020. Because all alternatives to using the Bay Downtown & Vicinity between 1985 and 2000. The number of trips on AC Transit would increase by about 65%, based on the service likely not travel at all without further capacity increases.

Mitigating those levels of congestion would require consideration of major changes to the regional transbay transportation system connecting the West Bay and East Bay. Possibilities include expansion of the Bay Bridge or Hayward-San Mateo Bridge to provide bus and rideshare opportunities, or construction of an additional "southern crossing" bridge from San Francisco or northern San Mateo County. Transit options include installing a higher capacity computer system enabling BART to operate trains at higher frequencies, or expanding service via another BART transbay tube. Other measures, such as new ferry services, would enhance the use of alternate transportation modes.

Virtually all of these concepts would require the City to work with MTC, Caltrans, and local government agencies to undertake the regional planning needed to expand transbay transportation capacity.

For more detail on future travel conditions to the East Bay, see Volume Two, pp. VI.E.31-34, 37-41, 71-78, 80-82, 87-91, 94-98, 100-101, 103-123, 126-127, 129-131, 133-140, 215-216, and 226-230.

Peninsula Corridor

Between 1985 and 2000, traffic would increase on U.S. 101 and Interstate 280, the freeways serving the Peninsula. However, there would be less congestion on those routes at the San Mateo County Line than on the Golden Gate and Bay Bridges. Both U.S. 101 and I-280 were only moderately congested at the San Mateo County line in 1985. In or near San Francisco, the capacity of local streets, U.S. 101, and I-280 would be sufficient to handle future travel

demand; the switch from highway to transit modes by Downtown & Vicinity commuters assumed for the Golden Gate and Bay Bridges would not be required for the routes serving the Peninsula. The transit analysis for 2000 and 2020 in this regional corridor therefore uses the same rates of transit use as found in 1985.

U.S. 101 at the San Mateo County line would operate at capacity for about 2.5 hours in 2000, with heavy congestion and speeds of 30 miles per hour occurring during that afternoon peak period. By 2020, heavy congestion on U.S. 101 would last for over four afternoon hours. I-280 would operate with only moderate congestion at the county line in 2000 and 2020, with speeds averaging 35 to 45 miles per hour throughout the peak period. I-280 and U.S. 101 would be heavily congested and operate at capacity through the Alemany interchange where they meet in San Francisco. The congestion projected for those freeways in 2020 would be reduced if commuters from the Downtown & Vicinity chose to increase their use of transit or ridesharing above 1985 levels.

The use of transit to the Peninsula would increase in all Alternatives. The level of service on transit would remain high, as there would be no system where ridership would be greater than available seats. In Alternative N ridership on all transit systems would grow by 32% between 1985 and 2000. The relocation of the CalTrain station in Alternatives A and B would reduce potential use of that transit service. In Alternatives A and B, use of BART and SamTrans would grow by about 40%, while CalTrain ridership would grow by just 4%. For further discussion of the impacts of this potential loss in ridership on the regional transportation system and on CalTrain, see the section on Variations on Alternatives in this chapter. In 2020 CalTrain, BART and SamTrans would carry even larger loads, but would continue to operate below capacity.

To mitigate the congestion projected for U.S. 101, the City could work with MTC, BART, CalTrain, and SamTrans to develop a plan to coordinate and improve Peninsula rail and bus transit services, including extension of BART to the Peninsula and CalTrain to downtown.

For more detail on future travel conditions to the South Bay, see Volume Two, pp. VI.E.31-38, 42-43, 61-62, 71-82, 85-89, 91-92, 94-99, 101-104, 106-109, 113-122, 128-137, 216-217, and 230-231.

Regional Highway Constraint Points

The detailed quantitative analysis in the EIR addresses future impacts at specific screenlines in the North Bay, East Bay, and South Bay Peninsula travel corridors. However, other segments of the regional transportation system, beyond the screenlines used in the analysis, would also be more congested in the future. As a result of growth in regional travel demand, the following freeway segments could constrain San Francisco travel: the I-80/I-580/I-880 interchange in Oakland, the Caldecott Tunnel on State Route 24, I-80 in Alameda and Contra Costa Counties, U.S. 101 in Marin County, and U.S. 101 south of I-380 in San Mateo.

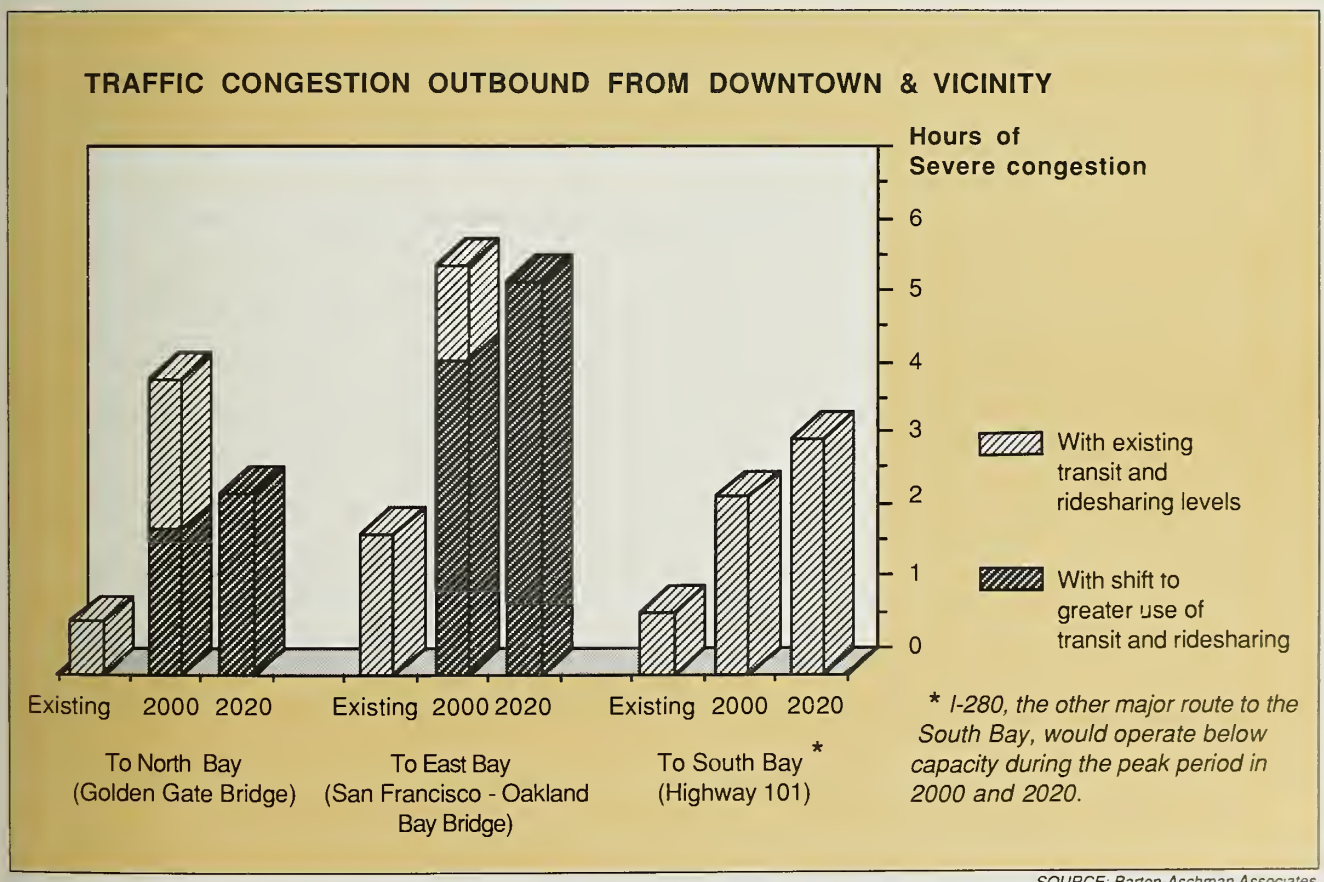
For more detail on regional highway constraint points, see volume Two, pp. VI.E 133-140.

Mitigation Measures

Thirty-nine mitigation measures address impacts within the Project Area, as well as cumulative impacts in the City and regional travel corridors. For cumulative impacts, a list of

transportation improvements that were assumed in the impact analyses for 2000 are included before identifying other measures required to mitigate regional and citywide impacts by 2000. Measures describing possible types of approaches to mitigate project and regional impacts by 2020 follow.

There are 16 transportation system capacity improvements that can be reasonably assumed to happen by 2000 that are incorporated into the impact analyses. Those include freeway widening on U.S. 101 in Marin and San Mateo Counties and on I-80 in Alameda and Contra Costa Counties, bus and carpool lanes on U.S. 101 in Marin and on I-80 and I-580 in Alameda Counties, BART turnaround in Daly City and extension to Colma, increased service levels on Golden Gate Transit, BART, AC Transit, SamTrans, and MUNI, and MUNI streetcar


TRAFFIC CONGESTION OUTBOUND FROM DOWNTOWN & VICINITY
Hours of Severe congestion
6
5
4
3
2
1
0
With existing transit and ridesharing levels
With shift to greater use of transit and ridesharing
Existing 2000 2020
Existing 2000 2020
Existing 2000 2020
To North Bay (Golden Gate Bridge)
To East Bay (San Francisco - Oakland Bay Bridge)
To South Bay *
(Highway 101)
* I-280, the other major route to the South Bay, would operate below capacity during the peak period in 2000 and 2020.

SOURCE: Barton-Aschman Associates

Figure II.36: Traffic Congestion Outbound from San Francisco During the Afternoon Commute Period. *Highway congestion from travelers leaving San Francisco during the afternoon commute will increase. By 2000, congestion would reach levels where many more travelers from the Downtown & Vicinity would shift from single-occupant vehicles to transit or ridesharing (see Figure II.35). This figure shows congestion in 2000 both with and without that modal shift for the Golden Gate and Bay Bridges. Since no plans for more transit service in 2020 are yet available, the estimated congestion levels for the Golden Gate and Bay Bridges in 2020 do not assume any further modal shift. Because freeway and street capacity to the South Bay would be sufficient to handle future travel demands, no modal shift is assumed.*

extensions on the F-Market and J-Church lines.

There are 10 measures that could be implemented to mitigate regional growth impacts in 2000. Those include such measures as further expansions of bus/High Occupancy Vehicle facilities and increases in transit service levels for BART, AC Transit, and Golden Gate Transit to reduce crowding in 2000.

There are 24 measures which would mitigate the impacts of the Alternatives in 2000 and beyond. Those include such measures as improvements in the Project Area street system, MUNI Metro extension and provision of a storage yard in the Project Area, routing of other MUNI services into the Project Area, measures to avoid loss of CalTrain ridership by relocation of the station in Alternatives A and B, maintenance of existing or construction of new industrial rail lead tracks to insure that all users of rail freight service continue to be served, establishment of a Transportation Systems Management (TSM) program to coordinate use of transit and ridesharing in order to reduce the use of automobiles in the Project Area, possible Metro light rail or streetcar service between Mission Bay and the Civic Center area, provision of adequate off-street parking facilities or measures to reduce parking demand, and improvements for bicycles and pedestrians.

There are five measures proposed to mitigate the impacts of regional growth in 2020. Those measures include expanding transbay transportation capacity to the East Bay by constructing a new bridge between Alameda and San Mateo Counties, widening the San Francisco-Oakland Bay Bridge or Hayward-San Mateo Bridge, or providing a new transbay tunnel or an enhanced train-control computer system for BART, expanded transbay capacity to the North Bay through provision of bus lanes or light-rail service on a second deck of the Golden Gate Bridge, and expanded transit opportunities to the South Bay via a CalTrain extension to downtown San Francisco, or BART and MUNI extensions to the Peninsula.

See Volume Two, pp. VI.E.198-231, for transportation mitigation measures.

AIR QUALITY

This section addresses Mission Bay's contribution to regional air pollutant emissions, local carbon monoxide concentrations, and Mission Bay's conformity with the Bay Area Air Quality Plan. Motor vehicles would be Mission Bay's primary source of air pollution. Emissions of several air pollutants would exceed significance thresholds established by the Bay Area Air Quality Management District. Emissions of hydrocarbons and nitrogen dioxide, precursors of ozone, could contribute to continuing occasional violations of ozone standards in the Bay Area. Carbon monoxide concentrations at congested intersections in and near Mission Bay would not exceed state or federal standards.

Emissions

Motor vehicle exhaust emissions would be the primary source of air pollutants in Mission Bay. Building emissions, primarily from combustion of natural gas for space heating, would be negligible. Mission Bay emissions would affect local and regional air quality. Ozone and carbon monoxide concentrations occasionally violate air quality standards at some locations in the Bay Area. Mission Bay emissions of hydrocarbons and nitrogen dioxide, precursors of ozone, would contribute to regional ozone concentrations. Emissions would also add to local carbon monoxide concentrations at congested intersections in the vicinity.

At build-out under Alternative A, Mission Bay vehicles would emit about 42 tons of carbon monoxide, 1.8 tons of hydrocarbons, 2.4 tons of nitrogen oxides, 0.3 tons of sulfur dioxide, and 1.8 tons of particulates per day. Alternative B would generate about 60% of those emissions, while Alternative N would generate about 70%.

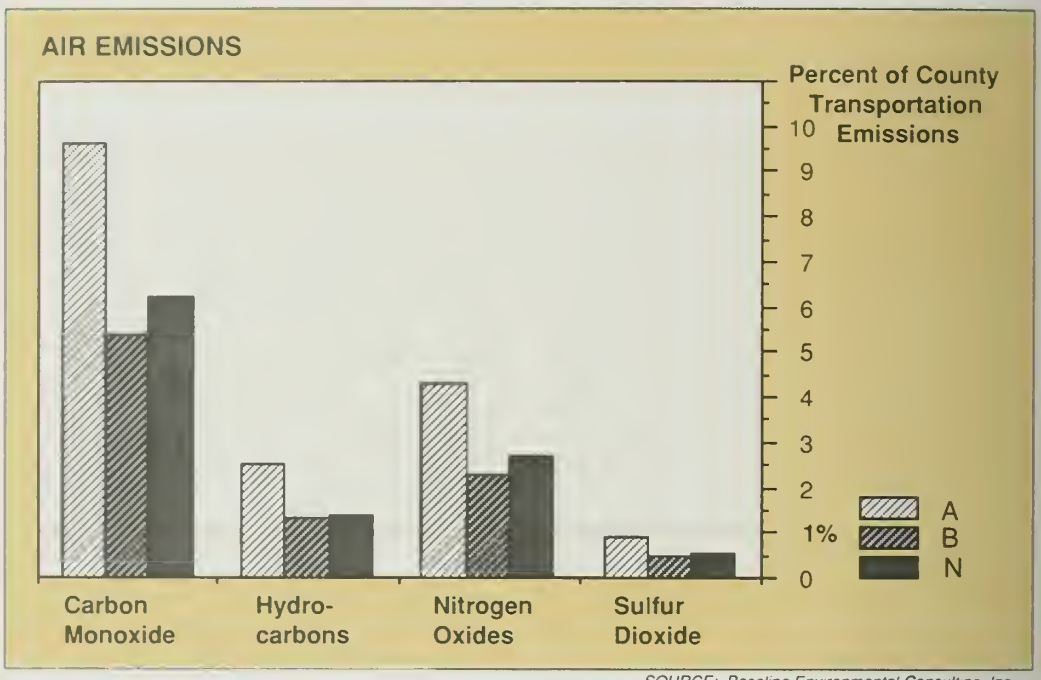
The Bay Area Air Quality Management District considers projects that produce a net increase in vehicle emissions greater than 1% of countywide transportation emissions to have a potentially significant impact on air quality. By build-out, emissions of carbon monoxide, hydrocarbons, and nitrogen oxides would exceed 1% of countywide transportation emissions under all Alternatives. (For build-out, year 2000 emission factors were used and emissions were compared with countywide transportation emissions projected for 2000, as emission factors and inventories beyond 2000 are not available.)

For more detail on air pollutant emissions from Mission Bay, see Volume Two, pp. VI.F.12-17.

Carbon Monoxide

Motor vehicles are the major source of carbon monoxide, and concentrations can build up at congested intersections. Computer modelling of carbon monoxide concentrations at eight of the busiest intersections in and near Mission Bay suggests that state and federal standards for eight-hour average concentrations (9 parts per million [ppm]) currently may be violated on occasion at the intersection of Sixth and Brannan Streets (13.4 ppm) and at the intersection of Third and Berry Streets (9.2 ppm). None of the eight intersections currently violate state or federal one-hour standards. Carbon monoxide concentrations are expected to improve throughout the region due primarily to better vehicle emission controls. Carbon monoxide concentrations at the eight intersections, even with Mission Bay and cumulative growth in traffic, are projected to decrease. No violations of state or federal carbon monoxide standards are expected under any of the Alternatives in 2000 or at build-out.

For more detail on local carbon monoxide concentrations, see Volume Two, pp. VI.F.9-10 and 17-18, and Table VI.F.4, p. VI.F.19.



SOURCE: Baseline Environmental Consulting, Inc. Environmental Science Associates, Inc

Figure II.37: Increase in Mission Bay Vehicle Emissions within San Francisco County. Motor vehicles would be the major source of Mission Bay air pollutant emissions. Motor vehicle emissions are shown as a percent of countywide transportation emissions. The Bay Area is currently in violation of federal ambient air quality standards for carbon monoxide and ozone (formed by hydrocarbons and nitrogen oxides in the presence of sunlight). Emissions exceeding 1% of county emissions are considered potentially significant by the Bay Area Air Quality Management District.

Bay Area Air Quality Plan

The 1982 Bay Area Air Quality Plan established schedules and strategies to comply with federal ozone and carbon monoxide standards established under the Clean Air Act by December 31, 1987. The deadline has now passed, and the Bay Area remains a non-attainment area for ozone and carbon monoxide (standards are occasionally violated). Congress is considering additional amendments to the Clean Air Act to address those areas of the country that remain in non-attainment, and a new plan may be required. Mission Bay development would be consistent with the 1982 Plan in some ways, but inconsistent in others. The 1982 Plan encourages development in urban service areas, mixed-use and infill development, and rehabilitation and reuse of existing buildings to reduce motor vehicle trips and thus reduce emissions. All Alternatives would be consistent with those strategies. However, all the Alternatives represent more intensive use of the Project Area than assumed under the 1982 Plan, so Mission Bay would be inconsistent with the Plan's land use and population projections.

For more detail on Mission Bay's consistency with the 1982 Bay Area Air Quality Plan, see Volume Two, pp. V.F.18 and 20.

Mitigation Measures

Four air quality mitigation measures, applicable to all Alternatives, are identified. Three measures address ways to reduce dust generated during construction (see the section on Construction in this chapter). One measure would reduce motor vehicle emissions through various transportation mitigation measures that would reduce motor vehicle trips (see the section on Transportation in this chapter).

See Volume Two, pp. V.F.23-25, for air quality mitigation measures.

NOISE

This section discusses noise in Mission Bay, the compatibility of proposed development with the noise environment, and impacts of traffic noise. San Francisco compatibility guidelines for community noise indicate that both existing and future noise levels in Mission Bay would exceed recommended levels for some proposed land uses under all Alternatives. Aside from construction noise, motor vehicles would be the major source of noise in Mission Bay. Noise levels would increase noticeably with development of Mission Bay, regardless of Alternative. Mitigation measures would be required to buffer residents and employees from noise.

Noise Levels

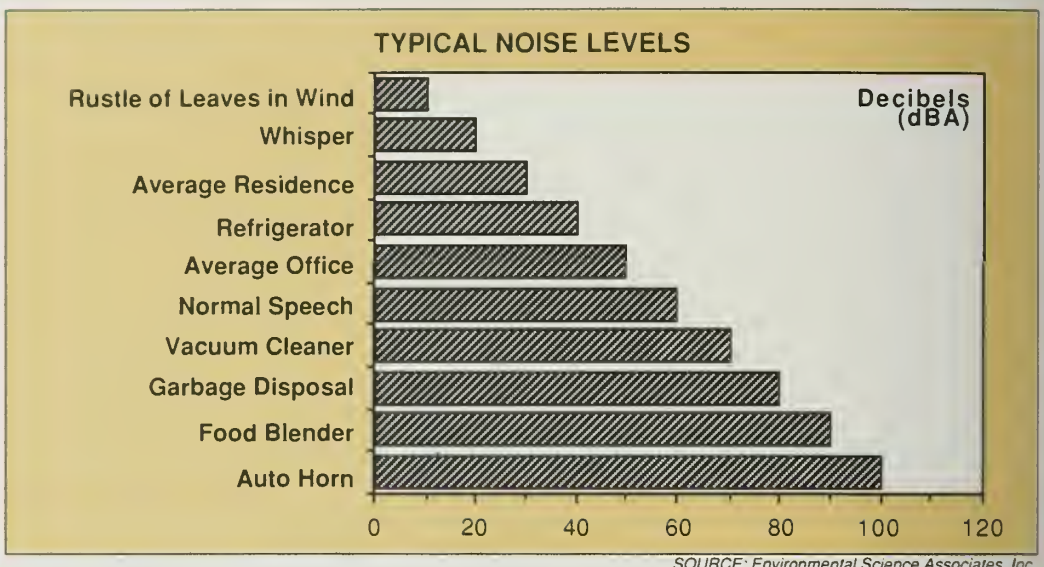
Traffic in Mission Bay, particularly on I-280, Third Street, and other major roads, produces a relatively steady background noise. Intrusive noise, such as that from trains, freight loading and unloading, ship repair and maintenance, and heavy equipment and machinery operation, stands out from the background noise. Twenty-four-hour average noise levels measured in the Project Area ranged from 65 to 75 dBA, L_{eq}. Peak instantaneous noise levels, which represent intrusive noise, ranged from 83 to 103 dBA during the same period. Houseboat residents on China Basin Channel, occupants of the San Francisco Recreational Vehicle Park, and residents of the Washington Hotel just outside of the Project Area are the existing occupants most sensitive to noise.

Land uses proposed under Alternatives A and B, and to a lesser extent under Alternative N, would conflict with San Francisco's Land Use Compatibility Chart for Community Noise, part of the Environmental Protection Element of the City's Master Plan. Day-night average noise levels in Mission Bay exceed 65 dBA, L_{dn}, ranging from 68 to 79 dBA, L_{dn}. According to the compatibility chart, therefore, construction of new housing should be discouraged. If housing development proposed in Alternatives A and B is pursued, detailed analyses of noise reduction requirements would be required, and noise insulation features would have to be incorporated into building design. Office uses throughout Mission Bay would also require analyses and noise reduction measures. Commercial uses other than offices would be compatible with the noise environment, except along Third Street between Fourth and 16th Streets, which is noisy enough (above 75 dBA, L_{dn}) to require noise reduction measures.

Because of the relatively high noise levels in Mission Bay, state Title 24 noise insulation standards also would require acoustical analyses before construction of multi-family housing under Alternatives A and B. The analyses must show that annual average interior noise levels with the windows closed would be less than 45 dBA, CNEL.

Describing Noise

Noise is measured in decibels (dB). The A-weighted decibel (dBA), approximates the frequency sensitivity of the human ear. Noise is described in various ways. Time-averaged noise levels account for the fluctuation in environmental noise over time. The equivalent noise level (L_{eq}) is a measure of the average intensity of noise. The day-night average noise level (L_{dn}), and the Community Noise Equivalent Level (CNEL), are roughly equivalent 24-hour average noise descriptors. Those two indices weight nighttime noise higher than daytime noise to account for greater annoyance caused by nighttime noise. Both L_{dn} and CNEL add a "penalty" of 10 dBA to noise between 10:00 p.m. and 7:00 a.m.; CNEL adds an additional five-dBA "penalty" to noise between 7:00 and 10:00 p.m.



SOURCE: Environmental Science Associates, Inc.

Figure II.38: Typical Noise Levels. *The normal range of human hearing extends from about 10 to 140 dBA. An increase of about three dBA in a normal noise environment is barely noticeable to most people; a 10-dBA increase is perceived as a doubling of loudness.*

Some intrusive noise sources would be relocated or eliminated with Mission Bay, although to a lesser extent under Alternative N than Alternatives A and B. The CalTrain station would be relocated to Seventh and Channel Streets under Alternatives A and B, reducing noise near Fourth and Townsend Streets. Maritime activities along the shoreline gradually would be relocated or replaced by quieter development in Alternatives A and B; however, S/LI/RD uses proposed under those Alternatives could be new sources of intrusive noise. Alternative N would develop with commercial and industrial activities similar to existing ones, with similar noise levels.

See Volume Two, pp. VI.G.1-7, for more detail on existing noise sources, noise levels, and the San Francisco Land Use Compatibility Chart (Figure VI.G.1, p. VI.G.4). For information on applicable noise standards, see pp. VI.G.7-9. See pp. VI.G.28-29 for information on Mission Bay's compliance with noise standards.

Traffic Noise

Motor vehicle traffic would be the dominant noise source in Mission Bay. Noise heard by residents, employees, and pedestrians in Mission Bay would vary by time of day and location. Noise levels would be loudest during peak traffic periods.

Computer modelling of Mission Bay traffic noise generally indicates that noise levels in 2000 and at build-out under all Alternatives would be noticeably higher than existing levels. Increased traffic would cause the already high noise levels in Mission Bay to increase and the area exposed to high noise levels to expand. Noise impacts would not vary noticeably among Alternatives.

Existing peak-hour roadside noise levels range from 66 to 74 dBA, L_{eq}. In 2000 and at build-out, peak-hour roadside noise levels would vary from about 64 to 80 dBA, L_{eq}. With few exceptions, noise levels would be higher than they currently are throughout Mission Bay, although they would not be perceptibly louder in all locations. The increases would be most noticeable near Third Street between Fourth and Mariposa Streets. Noise levels would decrease with increasing distance from the road, and in some instances would be further reduced by intervening buildings and landscaping. Interior noise levels would be about 10 dBA lower than exterior noise levels with open windows, and 20 to 35 dBA lower with windows closed.

The noisiest areas analyzed would continue to be near the I-280 overpass, especially at Mariposa Street, and along Third Street south of Fourth Street. Maximum increases in traffic noise would occur along Mariposa Street near Third Street. Peak-hour traffic noise there would increase about four to eight dBA, L_{eq}, due to the large increase in traffic anticipated, although noise levels there would still be lower than along Third Street. The quietest portions of the Project Area would be south of China Basin Channel, between Fourth and Sixth Streets, and along the eastern shoreline of Mission Bay.

Noise levels outside of the Project Area would not be noticeably affected by Mission Bay traffic because of existing high background noise levels and shielding by intervening buildings.

See Volume Two, p. VI.G.2, pp. VI.G.19-24, and Table VI.G.5, p. VI.G.20, for more detail on traffic noise.

Mitigation Measures

Nine noise mitigation measures are identified. Three measures, applicable to all Alternatives, would reduce noise levels at their source. Two of those would reduce construction noise, while the third would help to reduce motor vehicle noise through city controls on transit vehicles, routes, and track installation. Three measures would shield residents and workers from high noise levels by using noise-reducing building materials and techniques, separating noise-sensitive areas and noise sources through site and building design, and relocating housing in Alternatives A and B to quieter areas. Three measures would use barriers to impede the transmission of noise. One of those, applicable to all Alternatives, suggests the use of earth berms along streets; the other two suggest specific barrier locations in Alternatives A and B to reduce the impacts of noise on residents.

See Volume Two, pp. VI.G.30-34, for mitigation measures.

ENERGY

This section addresses energy that would be consumed by buildings and transportation throughout the life of Mission Bay. Building energy consumption could equal 190,000 to 360,000 barrels of crude oil per year at build-out; annual transportation energy consumption could equal 280,000 to 470,000 barrels. By considering energy consumption in the design of Mission Bay, steps could be taken to increase energy efficiency and reduce total energy consumed.

Buildings

Mission Bay would use electricity for lighting, heating, ventilating, and air conditioning (HVAC), and other electrical equipment and appliances. Natural gas would primarily be used for space heating, water heating, and cooking. Commercial buildings consume more electricity per square foot than residential buildings, while residential buildings consume more natural gas per square foot.

Building energy consumption in the Project Area at build-out would be about seven to 13 times existing consumption. Mission Bay's annual electricity consumption would be about 3.9% of the electricity currently used in San Francisco under Alternative A, 1.4% under Alternative B, and 2.5% under Alternative N. Natural gas consumption would be about 1.5% of existing consumption in the City for Alternatives A and B, and about 0.5% for Alternative N. Electricity and natural gas required for Mission Bay would be small compared to total consumption in PG&E's service area (0.2% or less for all Alternatives). Additional distribution lines and minor substation improvements would be required to provide electricity for Mission Bay; the distribution system surrounding Mission Bay would be expanded to supply natural gas.

Energy is discussed in terms of British thermal units (Btu); one Btu is the quantity of heat required to raise the temperature of one pound of water by one degree Fahrenheit. One barrel of crude oil is equivalent to about 5.8 million Btu.

For more detail on building energy consumption, see Volume Two, pp. VI.H.8-13, and Volume Three, Appendix H, Tables XIV.H.5-10. See Volume Two, pp VI.H.13-16, for information on required improvements to electrical and natural gas distribution systems.

Transportation Energy

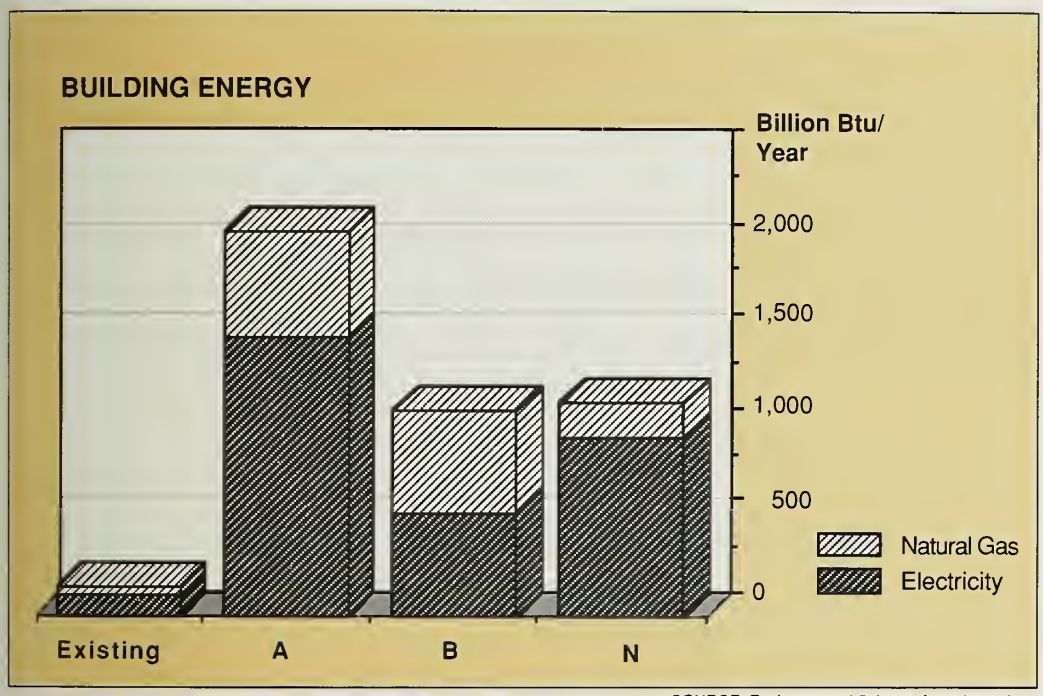
Travel associated with Mission Bay would increase the use of gasoline, diesel, and electricity for transportation. Mission Bay transportation energy consumption at build-out would be about four to six and one-half times existing consumption. Transportation energy consumption varies with the amount and method of travel. Public transportation is more energy efficient than the private automobile. Transportation energy efficiency would improve with the increased use of mass transit projected under all Alternatives and the continuing trend toward more fuel-efficient automobiles.

For more detail on transportation energy consumption, see Volume Two, pp. VI.H.16-20, and Volume Three, Appendix H, Tables XIV.H.13-18.

Mitigation Measures

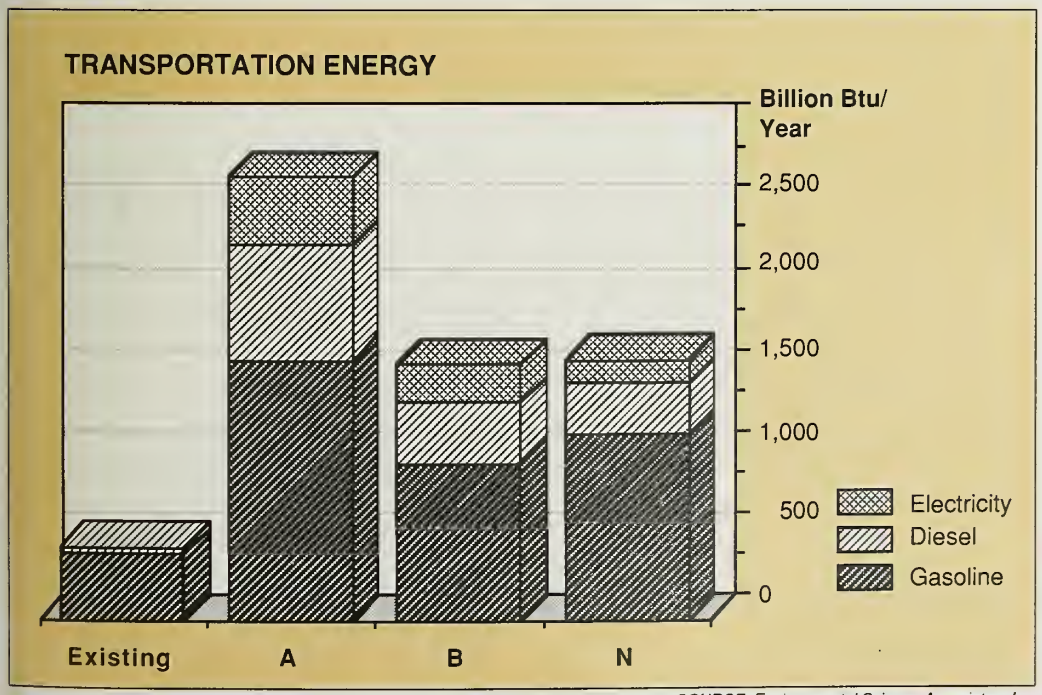
Three energy mitigation measures, applicable to all Alternatives, are included. One measure provides various ways to reduce the energy consumption of buildings, including district heating and cooling, alternative energy sources (such as cogeneration and solar energy), and energy-efficient design features. Also included are electrical load management and recycling and conservation of other resources. Additional measures are identified to reduce construction and transportation energy use.

See Volume Two, pp. VI.H.21-25 for energy mitigation measures



SOURCE: Environmental Science Associates, Inc.

Figure II.39: Annual Building Energy Consumption at Build-Out. *Annual building energy consumption (shown in Btu) would equal about 360,000 barrels of crude oil for Alternative A, 190,000 barrels for Alternative B, and 210,000 barrels for Alternative N.*



SOURCE: Environmental Science Associates, Inc.

Figure II.40: Annual Transportation Energy Consumption at Build-Out. *Annual transportation energy consumption (shown in Btu) would equal about 470,000 barrels of crude oil for Alternative A and 280,000 barrels for Alternatives B and N.*

ARCHITECTURAL RESOURCES & URBAN DESIGN

This section addresses five major topics: architectural resources, visual quality, urban design, shadows, and wind. Alternatives A and B would transform Mission Bay into new mixed-use neighborhoods, a dramatic change in the character of the area. Alternative N would retain or expand existing service, industrial, and maritime land uses. Closed Fire Station 30, the only notable architectural resource in Mission Bay, would be rehabilitated for community facilities in Alternatives A and N, but demolished in Alternative B. New development up to eight stories in height in Alternatives A and B would obstruct some views of the Project Area from Potrero Hill and Nearby Areas; some views of San Francisco Bay would be affected. Alternative N would have lower-scale, mostly one- to four-story buildings, with less impact on long-range views. Shadows from proposed buildings would not reach existing parks, but would shade Project Area open space depending on season and time of day. The low- and mid-scale development in all Alternatives would have little effect on wind.

Architectural Resources

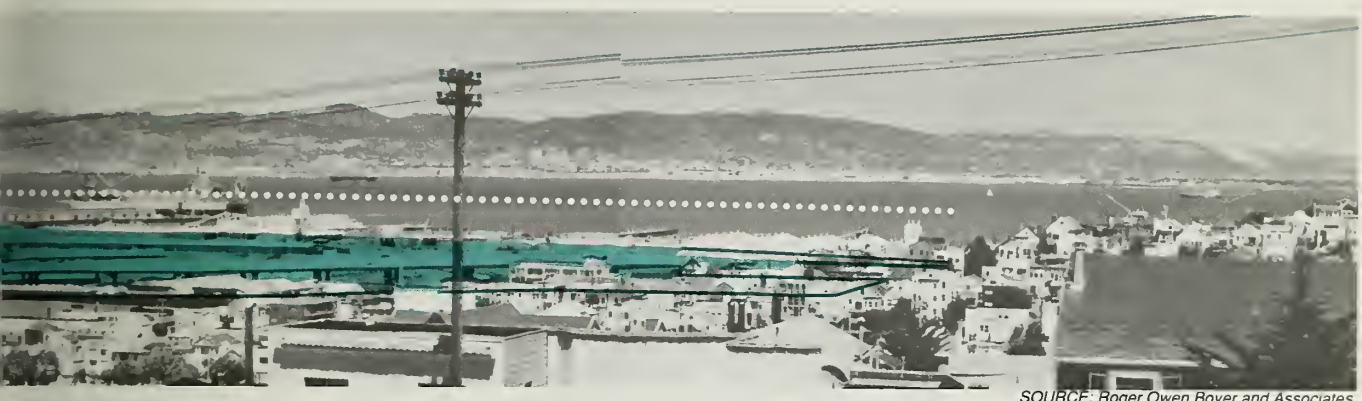
Although the surrounding area includes structures of architectural and historic merit, the Project Area contains only one notable structure, closed Fire Station 30 at Third and Fourth Streets. The fire station, a brick structure in the Mission style, may be eligible for listing on the National Register of Historic Places. Alternatives A and N would retain Fire Station 30 for community facilities. Alternative B would demolish the fire station and construct a larger community facility.

The Lefty O'Doul (Third Street) and Peter Maloney (Fourth Street) Bridges, adjacent to the Project Area, were both built in the 1930s and are unique engineering structures eligible for the National Register.

About 50 structures near Mission Bay have been recognized for architectural or historic and cultural significance in surveys done by the Foundation for San Francisco's Architectural Heritage or the Department of City Planning. Many are handsome brick industrial buildings or warehouses along Townsend Street or in

SOURCE Environmental Science Associates, Inc

Figure II.41: Fire Station 30. *Closed Fire Station 30, a brick structure with rich masonry detailing around its doors, windows, and cornices, is the one notable architectural resource in the Project Area. Alternatives A and N would rehabilitate the building for community service uses. Alternative B would demolish it.*



SOURCE: Roger Owen Boyer and Associates

Showplace Square. Those buildings reflect the 19th and early 20th century industrial character of South of Market and Mission Bay.

For more detail on architectural resources, see Volume Two, pp. VI.1.1-5 and 24-26.

Visual Quality

Mission Bay, reflecting its history as filled land, is a relatively level area where visual landmarks are primarily low-rise warehouse or industrial buildings, elevated freeways, and other structures. Mission Bay contrasts with higher features surrounding the area, such as Potrero Hill to the south and highrise buildings in the financial district to the north. The Bay on the east and the elevated I-280 freeway on the north and west also visually define the Project Area.

Mission Bay would alter views of downtown San Francisco, South of Market, the Bay, and the East Bay hills as seen from Potrero Hill. Figure II.42 shows that most of the Project Area is at least partially visible from residences or streets in north Potrero Hill. Visible from Potrero Hill are China Basin Channel, the China Basin Building, the CalTrain station and tracks, and waterfront pier sheds and docks. The Bay Bridge, East Bay hills, and other distant features, such as downtown Oakland and the University of California campanile in Berkeley, form the background of the view.

In general, the relatively low- and mid-scale development (up to 110 feet) assumed in the Alternatives would limit obstruction of long-range views. However, because of the diversity among the land use programs of the Alternatives, the visual aspects within Mission Bay would vary. In addition, views of the site would be notably altered in all Alternatives due to the removal of the I-280 stub between Third and Sixth Streets.

The visual analysis is based on assumptions about building envelopes for each type of land use in the Alternatives. Buildings could range from one- to two-story industrial/warehouse and S/LI/RD uses to three- to eight-story residential buildings and eight-story offices. From Potrero Hill, views of pier sheds along China Basin Street, some portions of the Bay and its shoreline, and portions of the lower deck of the Bay Bridge or the base of the bridge towers could be partially blocked by buildings in Alternatives A and B. Long-range views of Yerba Buena Island and the Berkeley hills would not be interrupted.

From points west of the Project Area, similar loss of bay views, except along street corridors, would be expected for Alternatives A and B. Motorists on I-280 west of the Project Area

Figure II.42: View from Potrero Hill. *The roof of the former Patrick Henry School at Vermont and 20th Streets affords a full view of Mission Bay, illustrating the low-rise character of the Project Area. From Potrero Hill, views across the site include the Bay Bridge and East Bay hills. The shaded area indicates the general boundaries of the Project Area. The dotted line represents a maximum 110-foot height at the eastern boundary of the Project Area. That line represents worst-case obstruction of views. Actual building design and siting would only intermittently approach that limit.*

SOURCE: Roger Owen Boyer and Associates

Figure II.43: Conceptual View, Alternative A, Third and Townsend Streets. *Alternative A would replace the RV Park, CalTrain station, and tracks with office buildings up to eight stories and related parking structures on the south side of Townsend Street. New buildings would limit distant views of Potrero Hill and the China Basin Building.*

would have obstructed views across the site to the Bay. Views from South of Market and downtown areas to the north of Mission Bay would not be greatly affected; generally, intervening buildings already block views of Mission Bay, except down street corridors. However, bay views looking south from lower floors (15th floor and below) of some downtown high-rise office buildings could be obstructed by Mission Bay development.

Overall, Alternative A would have higher density office, S/LI/RD, and residential buildings on the north, west, and south around medium-high density residential areas. Medium-density housing would be clustered around the Central Square open space, creating a bowl or transition from the flat topography of Mission Bay to higher elevations of Potrero Hill and buildings South of Market and downtown. Alternative B would also change scale from open space near China Basin Channel to higher density housing to the west, north, and south, although its scale would be more uniform than that of Alternative A. The amount of open space also differentiates the Alternatives. Alternative B would have major open space from Berry Street and the channel southerly to the Bay near Pier 54, as well as wetlands near China Basin. Alternative A open space would be focused near the channel and east of Third Street.

In contrast, the scale of development in Alternative N would be lower and less varied than in Alternatives A and B. Open space would be limited to narrow strips along China Basin Channel. While existing zoning in Mission Bay could allow buildings up to 200 feet high in part of the Project Area, industrial and commercial buildings in Alternative N probably would develop at heights up to 40 feet. The one exception is eight-story office buildings (up to 105 feet), which are assumed to develop on the block bounded by Third, Townsend,

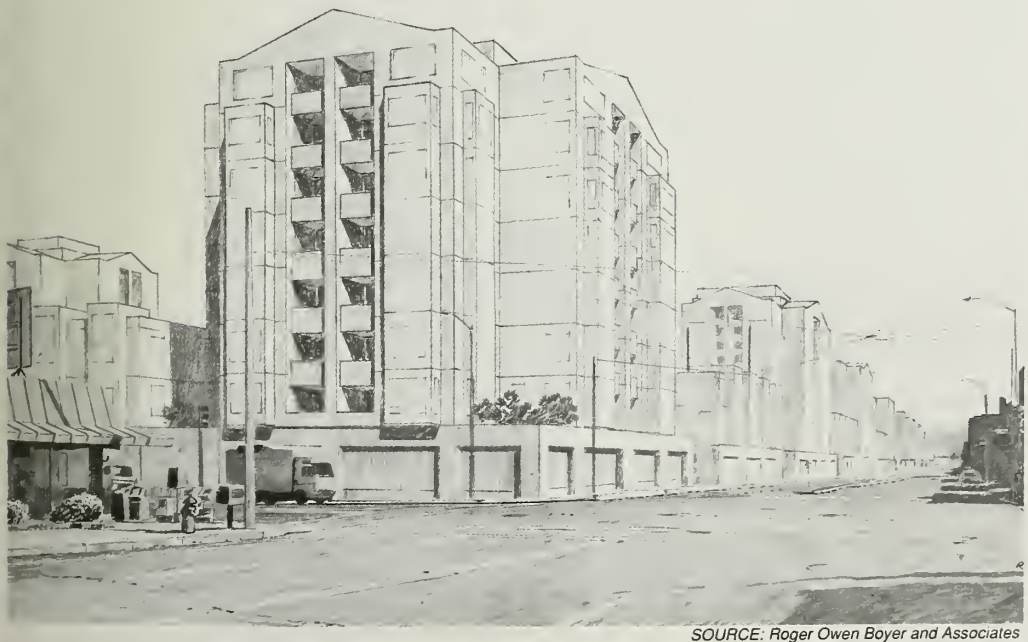
Fourth, and King Streets. As a result, Alternative N would have less impact on long-range views, and would not interfere with views of the Bay and Bay Bridge. Views from Potrero Hill of the waterfront along China Basin Street would be obstructed.

For more detail on visual quality, see Volume Two, pp. VI.5-6 and 26-36.

Urban Design

In addition to long-range views, the EIR evaluates selected street-level viewpoints within Mission Bay. Existing views typically reflect how the relatively low scale, low intensity development and level topography of Mission Bay emphasize major background features, such as Potrero Hill, I-280, or downtown San Francisco. That character would be altered under all Alternatives, although to a greater extent in Alternatives A and B than in Alternative N. Figures II.43 to II.48 illustrate views of the Alternatives at three street-level locations. The drawings are not architectural proposals, nor do they attempt to show the people and traffic of urban life; they are conceptual depictions based on zoning and building envelope characteristics and City Planning Code requirements for each type of land use.

In Figure II.43, showing Third and Townsend Streets under Alternative A, eight-story office buildings and parking structures would replace the San Francisco Recreational Vehicle Park and the CalTrain station and tracks, limiting views of Potrero Hill and the China Basin Building. Compared to the older, often ornamented brick or masonry buildings fronting the north side of Townsend Street, new buildings would be of greater scale and bulk and would probably have different facade materials. Alternative B, in Figure II.44, with seven- or eight-story residential buildings, would have



SOURCE: Roger Owen Boyer and Associates

Figure II.44: Conceptual View, Alternative B, Third and Townsend Streets.
Alternative B would have residential buildings up to seven or eight stories south of Townsend Street. Residential buildings would have more varied floor sizes and facade details than office buildings, but would have similar effects on views.

SOURCE: Roger Owen Boyer and Associates

Figure II.45: Conceptual View, Alternative B, China Basin Channel. *Seen from the Fourth Street Bridge, views of the I-280 freeway stub (which would be demolished by 2000) would be replaced by views of six- to eight-story residential buildings north of the channel. Landscaped shoreline open space north of the channel and wetlands to the south would form a foreground to the houseboat community and I-280 Sixth Street ramp.*

similar effects on street-level views. Residential buildings, however, would have smaller floor sizes and more varied window and balcony features and facade setbacks. Views of Alternative N (not illustrated here) would be similar to Alternative A, with office uses on that block.

Alternative B, as seen from Fourth Street and China Basin Channel in Figure II.45, would include views of open space and residential buildings north of the channel, replacing views of the I-280 stub (which would be demolished by 2000). Wetlands would be developed south of the channel in Alternative B. Alternative A (not illustrated here) would also have views of housing replacing I-280, although the buildings would be closer to the channel and there would be less open space than in Alternative B. Alternative N would have narrow open space strips along both sides of the channel, adjacent to two- to three-story industrial buildings as shown in Figure II.46. The channel houseboat community would remain under all Alternatives.

In the view north at Third, Fourth, and Mission Rock Streets, as seen in Figure II.47 for Alternative A, a hotel and housing west of Third Street would replace cleared land and views of the China Basin Building and downtown; a community services building would be east of Third Street. Alternative B, in Figure II.48, would retain partial views of those features across a major open space. Alternative B would also include a community services building east of Third Street. Alternative N (not illustrated here) would have views of low-rise industrial and retail buildings, creating the least change among the Alternatives.

For more detail on urban design, see Volume Two, pp. VI.I.6, 11-23, and 37-55. See Figures VI.I.3 and 4, pp. VI.I.12-13 and 16-17, for existing views. See Figures VI.I.6-11, pp. VI.I.38-39, 42-43, 46-47, 48-49, 52-53, and 54-55, for additional conceptual drawings of Mission Bay views.

Shadows

The effect of Mission Bay shadows on open space would depend on the specific design and placement of individual buildings. Because detailed building designs are not available, the maximum shadows possible from each type of land use were evaluated, based on maximum building height and lot coverage. Building shadows vary in length and location throughout the day and year. Shadows were examined for

SOURCE: Roger Owen Boyer and Associates

Figure II.46: Conceptual View, Alternative N, China Basin Channel.
From Fourth Street near the channel, Alternative N would have views of industrial buildings north and south of the channel, with narrow strips of open space along the channel. As with Alternatives A and B, the houseboats would remain.

SOURCE: Roger Owen Boyer and Associates

Figure II.47: Conceptual View, Alternative A, Third, Fourth, and Mission Rock Streets.
Views looking north in Alternative A would include a variety of uses – a hotel in the center of the view, residential uses on the west, and a community facilities building in the foreground. Those buildings would replace vacant land and distant views of the China Basin Building and downtown. Rehabilitated Fire Station 30 would be south of Mission Rock Street, not visible in this view.

Figure II.48: Conceptual View, Alternative B, Third, Fourth, and Mission Rock Streets. *With Alternative B, the view would include open space north of the intersection, flanked by three- to four-story residential buildings to the west and community facilities to the east. Portions of the China Basin Building and downtown skyline would remain visible.*

SOURCE: Roger Owen Boyer and Associates

10:00 a.m., noon, and 3:00 p.m., representing the primary period of open space use, for the solstices and equinoxes, which represent the seasonal range of shadows.

Buildings in Mission Bay would not shade public parks outside the Project Area; they would shade open space proposed under each Alternative to varying degrees depending on season and time of day. Open space next to the north side of buildings would be shaded the most. Relatively large open spaces, such as that east of Third Street in Alternative A, or the central open space in Alternative B, would be shaded less than small, relatively narrow corridors surrounded by buildings, such as those east of Michigan Street in Alternative A. Most of the larger open spaces would be in sun between between 10:00 a.m. and 3:00 p.m. throughout the year. Conversely, much of the narrow open space corridors would be in shade throughout the day, particularly in winter months. Open space north of China Basin Channel under Alternative N would be in sun through most of the day. Much of the open space south of the channel would be shaded in the morning.

For more detail on shadows, see Volume Two, pp. VII.51 and 56–69, and Tables VII.3-5, pp. VII.59, 64, and 68.

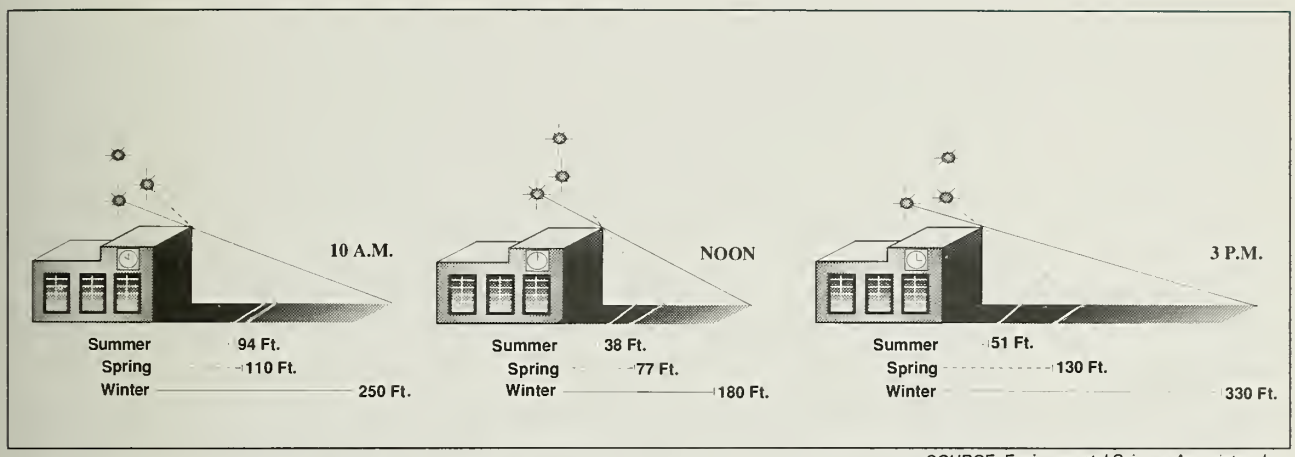
Wind

At heights of about 100 feet or more, buildings can redirect wind flows around them and divert wind downward, substantially increasing wind speed and turbulence at street level. Because the Alternatives are relatively low- to mid-rise in scale, Mission Bay would have little impact on wind. The type and degree of wind effects ultimately depend on building design, height, bulk, and siting in relation to nearby buildings, streets, and open space.

For more detail on wind, see Volume Two, pp. VII.69-71.

Mitigation Measures

Ten mitigation measures related to architectural resources and urban design are identified. One measure would maintain the architectural integrity of closed Fire Station 30 in Alternatives A and N. One measure would reduce adverse urban design effects in Alternatives A and B by adopting guidelines requiring variations in building height, bulk,



SOURCE: Environmental Science Associates, Inc.

Figure II.49: Relative Shadow Length by Season and Time of Day.
Shadow lengths relative to building height vary by season and time of day. For illustrative purposes, the length of shadows from a hypothetical building 100 feet in height are shown. Shadows are the longest in winter, when the sun is lowest in the sky, and shortest in the summer, when the sun is at its highest. Shadow lengths in spring and fall are about equal, in between winter and summer shadows in length. The direction of the shadows moves with the sun throughout the day, generally extending northwest in the morning, north at mid-day, and northeast in the afternoon.

and facade materials to relate to the character of Fire Station 30 and other older buildings along Townsend and Seventh Streets, and avoiding benching (an extended row of buildings of uniform height and bulk). One measure for all Alternatives would require adequate sidewalk widths, street lighting, and landscaping. Two measures for Alternatives A and B would visually screen residential areas from adjoining S/LI/RD areas and maintain partial views from I-280 east across the Project Area. One measure would reduce the 200-foot height district in the center of the Project Area to 130 feet in Alternative N. Two mitigation measures would limit shadow effects of Alternatives A and B by using design guidelines and criteria from San Francisco's Sunlight Ordinance. Two measures would reduce adverse wind effects through building design and landscaping for Alternatives A and B, and require evaluation of wind effects during design of buildings 100 feet or higher in all Alternatives.

See Volume Two, pp. VI.I.72-75, for mitigation measures.

CULTURAL RESOURCES

This section discusses the potential for prehistoric and historic cultural resources in Mission Bay. While the potential for prehistoric resources is low, archival research indicates that specific areas of Mission Bay probably contain subsurface historic artifacts. New construction under all Alternatives could disturb subsurface historic resources. Closed Fire Station 30, which may be eligible for the National Register of Historic Places, would be preserved in Alternatives A and N but demolished in Alternative B. Basalt block pavement on King and Sixth Streets, considered of local historic interest, would be affected by all Alternatives.

Prehistoric Resources

Prior to European settlement, Mission Bay was a shallow extension of San Francisco Bay with a marshy shoreline. Mission Creek, which drained the east slope of Twin Peaks, flowed into the bay. Most of the Project Area was covered by the bay; low lying shore areas comprised the remainder. Mission Bay does not have any known prehistoric Native American sites. The lack of known sites reflects both the open water and marshland character of prehistoric Mission Bay and the fact that numerous archaeological sites in the Bay Area were destroyed before the adoption of systematic recording and evaluation procedures. Three locations on the perimeter of old Mission Bay are possible areas of prehistoric settlement or hunting and gathering encampments (see Figure II.52). Although no archival evidence suggests that prehistoric sites are actually present, there is some chance of finding subsurface artifacts at those locations. All Alternatives involve development that would disturb those areas.

For more detail on prehistoric resources, see Volume Two, pp. VI.J.1, 14, and 16.

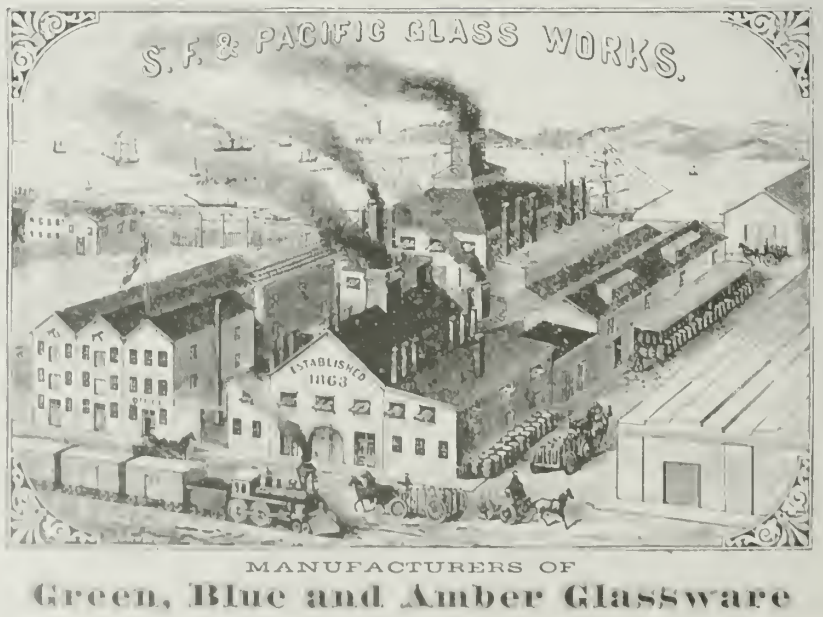


Figure II.50: San Francisco and Pacific Glass Works. *The San Francisco and Pacific Glass Works, shown in an 1883 woodcut, was one of a number of similar enterprises in Mission Bay in the late 19th century. As noted in the illustration, this plant was near Fourth Street, between King and Berry, on the Mission Bay waterfront at the time*

SOURCE: Olmsted et al., 1977

Courtesy, The Bancroft Library

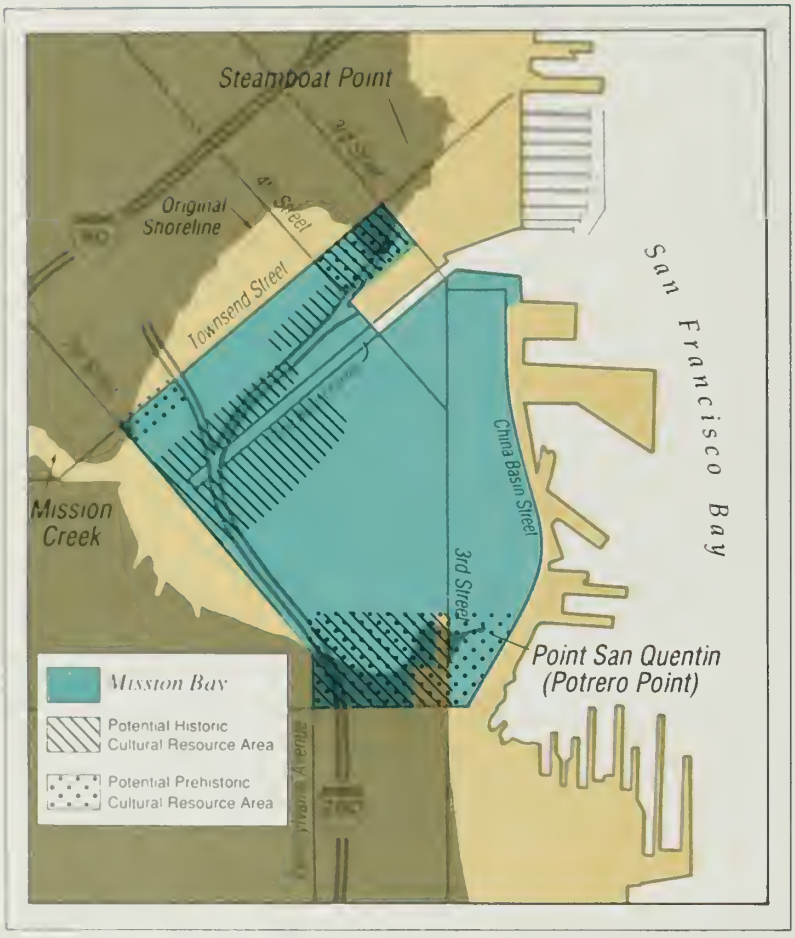
Figure II.51: China Basin Channel, 1921. *This view looking northwest across China Basin Channel illustrates shipping activities on the channel and related uses in Mission Bay. The Mission-style Southern Pacific depot is in the background, and lumberyards and oil and lead works adjoin the waterway.*

Historic Resources

Little development occurred in the Project Area during the Spanish/Mexican and Gold Rush periods. By the mid-1860s construction of Long Bridge across the mouth of Mission Bay and other transportation improvements stimulated early industrial use of the Project Area, and fill began to be added around the margins of Mission Bay. As San Francisco grew in the late 19th century, Mission Bay served as an industrial and transportation center, along with South of Market and the southern waterfront. No one industry dominated the Project Area; glass-making, gas works, lumber milling and related wood-working industries, shipbuilding, food processing and canning, and warehousing were among the activities found in Mission Bay. Those uses mirrored San Francisco's diverse industrial development and are potential sources of historic artifacts.

The Southern Pacific Railroad, which became the largest landowner in the Project Area, built its first San Francisco terminal in Mission Bay in the 1870s. Southern Pacific added fill to the then-enclosed Mission Bay. While Southern Pacific first developed the area north of present-day China Basin Channel with freight sheds and railyards, by 1903 most of the railroad's holdings west of Long Bridge were reclaimed land containing additional railyards and warehouses. The area east of Third Street was filled to approximately its current extent by 1913.

The early 20th century saw the growth of the oil industry in the Project Area, as well as the entry of the Atchison, Topeka and Santa Fe Railway. Santa Fe established railyards and a ferry slip to transport rail cars to its main line terminal in Richmond. Oil, chemical, and lumber industries, as well as rail uses, continued in the Project Area until the mid-20th century. The



SOURCE: David Chavez & Associates
Environmental Science Associates, Inc.

Figure II.52: Potential Cultural Resource Areas.
Although there are no known prehistoric archaeological sites in the Project Area, there may have been prehistoric settlement or hunting and gathering encampments near Steamboat Point, Point San Quentin, and Mission Creek where it entered Mission Bay. Archival research has identified areas that might contain historic artifacts. The area near China Basin Channel is the site of the 19th century city dump. The other areas are the sites of late 19th century shipbuilding and glass-making establishments, important early industries in San Francisco.

relative importance of Mission Bay as an industrial area declined as such activities expanded further south and as highway and bridge access to other parts of the Bay Area improved. World War II also stimulated the spread of industrial development outside of San Francisco. In recent years railroad activities, trucking, and warehousing have been the primary uses of Mission Bay.

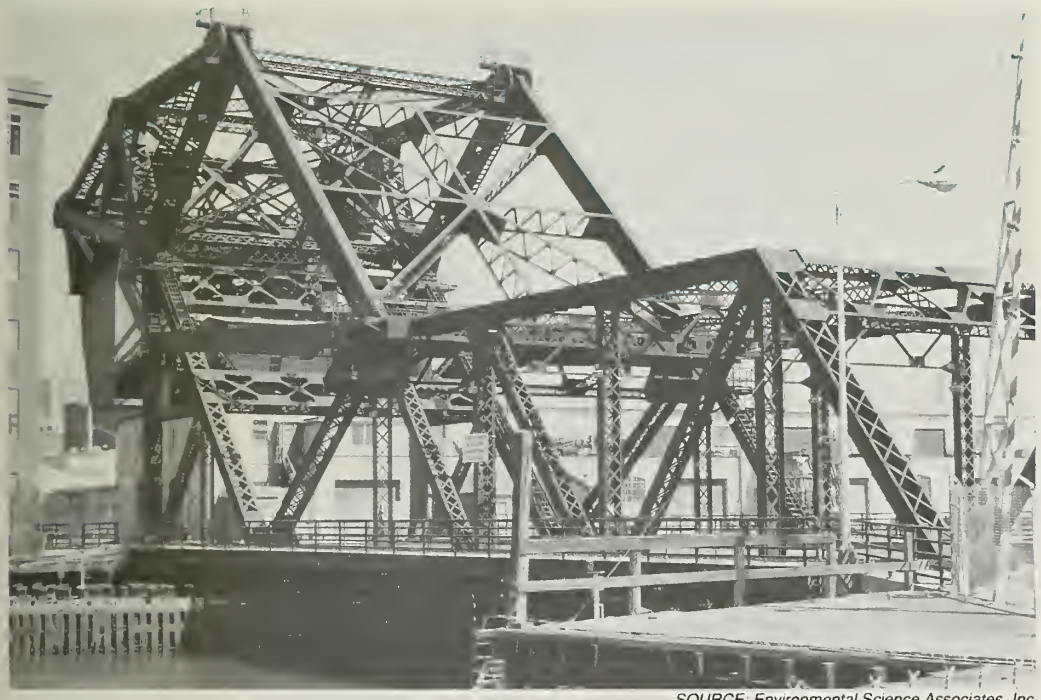
Archival research has identified seven areas that might contain subsurface artifacts illustrating the early culture and industry of Mission Bay. Those historic artifacts could be considered significant under National Register of Historic Places criteria. All Alternatives would include development that could disturb those areas.

Closed Fire Station 30 may be eligible for the National Register of Historic Places and would be preserved in Alternatives A and N but demolished in Alternative B. Basalt-block paving on parts of King Street between Third and Seventh Streets and on Sixth Street is of local historic interest, but is not eligible for National Register listing. The paving would be disturbed by development or street reconstruction in all Alternatives.

For more detail on Mission Bay's history and potential historic resources, see Volume Two, pp. VI.J.2-13 and 15-21.

Mitigation Measures

Seven cultural resource mitigation measures are identified. Two measures, applicable to all Alternatives, would require archaeological testing, research, and recovery before construction, along with archaeological monitoring during construction, in six of the seven identified historic resource areas. Another measure, also applicable to all Alternatives, would require archaeological monitoring during construction in the seventh area, the 19th



SOURCE: Environmental Science Associates, Inc.

Figure II.53: Third Street Bridge. *The Third Street (Lefty O'Doul) Bridge over China Basin Channel dates from the 1930s. This bridge and the Fourth Street (Peter Maloney) Bridge are unique engineering structures eligible for the National Register of Historic Places. The bridges would not be affected by Mission Bay.*

century city dump (pre-construction testing in the dump area is not proposed because scavenging activities when the dump was active destroyed its integrity). One measure would evaluate the architecture and history of closed Fire Station 30 and maintain its architectural integrity if preserved and reused in Alternatives A and N. Another measure specifies requirements for Alternative B, should Fire Station 30 be found to be eligible for the National Register or for City Landmark designation. One measure would preserve the existing basalt paving blocks or reuse them in other areas in all Alternatives. A final measure, applicable to all Alternatives, recognizes the potential archaeological sensitivity of all of Mission Bay and provides procedures to be used, including notification of city officials, delay of construction activity, and possible recovery programs, should artifacts be found during building excavation.

See Volume Two, pp. VI.J.22-27 for mitigation measures.

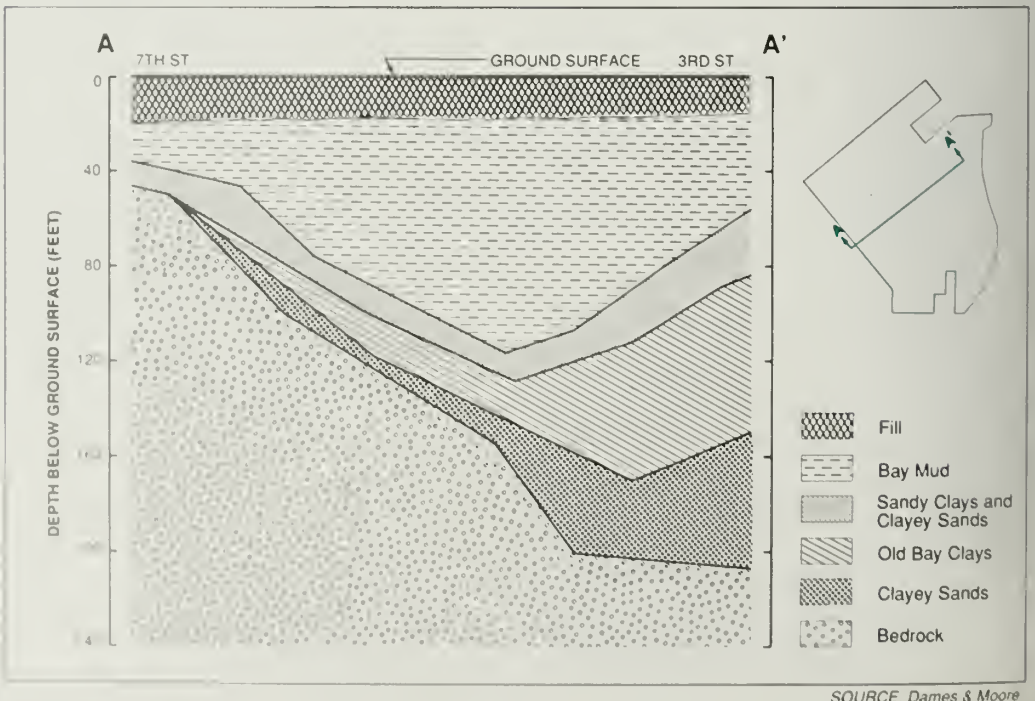
GEOLOGY & SEISMICITY

This section addresses settlement, foundation types, earthquakes, secondary earthquake hazards, earthquake damage, and measures to mitigate geologic and seismic hazards. A major earthquake is an inevitable part of the San Francisco Bay Area's future. The odds of a major earthquake within the next 20 years are about one in ten. Artificial fill and Bay Mud underlying Mission Bay exacerbate groundshaking and secondary seismic hazards, as well as create settlement problems. However, seismic hazards can be greatly reduced through proper design and other geologic constraints can be minimized.

Settlement

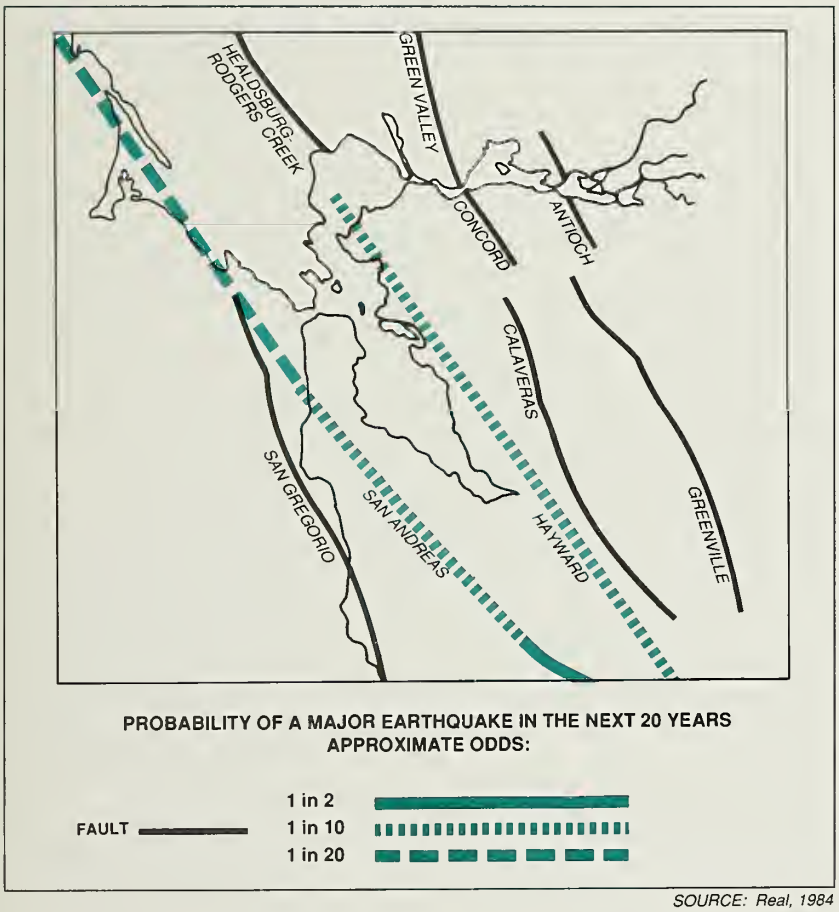
Mission Bay was originally a shallow inlet off San Francisco Bay. It was gradually filled in the late 1800s and early 1900s. The composition of the fill is varied, consisting of mixtures of sand, silt, clay, brick, cinder, concrete rubble, and trash. Underlying the unengineered, artificial fill is the Bay Mud. These bay sediments, up to 100 feet thick in the central portion of Mission Bay, are weak, easily compressed, and high in water content. Older and more stable bay sediments and bedrock underlie the Bay Mud.

Settlement of several feet has occurred since fill was first placed on the site and will continue in the future, although at a lesser rate. In general, the central and eastern portions of Mission Bay are more susceptible to settlement than other portions. Settlement could exceed six inches in the next 30 years in the center of the Project Area. Depending on foundation type, buildings can settle at different rates than surrounding areas, potentially damaging sidewalks, driveways, or utilities. Differential settlement, where adjoining areas settle different amounts, occurs where there are differences in the thickness and compressibility of fill, variability in the thickness of the Bay Mud, or where addi-



SOURCE: Dames & Moore

Figure II.54: Subsurface Profile through Center of Mission Bay. *Many of Mission Bay's geologic constraints are related to artificial fill and Bay Mud. Those layers amplify groundshaking from earthquakes, contain sand lenses subject to liquefaction, and cause settlement.*



SOURCE: Real, 1984

Figure II.55: Major Bay Area Faults.
Mission Bay would be most affected by an earthquake on the San Andreas or Hayward Faults. A major earthquake on either fault would cause very strong to violent groundshaking at Mission Bay.

tional local settlement has occurred under structures. Stress from differential settlement can damage structures. The central and eastern portions of Mission Bay are also most susceptible to differential settlement.

Heavy loads from buildings placed directly on fill materials near the southern edge of China Basin Channel or along the bayshore could cause mud to squeeze out into unconfined areas at the water's edge, forming mud waves. Mud waves would reduce water depth, hindering navigation.

For more detail on settlement and the geologic composition of Mission Bay, see Volume Two, pp. VI.K.1-10 and 29-30.

Foundations

Structures would be supported by pilings driven into more solid material at depth, or founded on thick concrete slabs that "float" on a layer of engineered fill or on layers of soil beneath the unstable layers. Both foundation types are designed to support the structure in the event of ground failure from earthquakes.

Foundation design depends on building height and the amount of settlement expected at the building site. Detailed engineering studies would be required before foundation design. Piles would be used to support buildings greater than five stories in height or in locations where settlement of more than six inches is expected. Pile-supported structures would not settle ap-

preciably, but surrounding roads, sidewalks, and open space would continue to settle, causing those areas to sink away from buildings. Buildings supported by piles would not cause mud waves.

In areas not subject to extensive settlement, one- to two-story buildings could be supported by conventional spread footings or stiffened slabs. Buildings supported by those types of foundations settle faster than the surrounding soil. Compensating foundations could be used for structures up to five stories in height where settlement is not expected to be extensive. In a compensating foundation, also known as a floating or raft foundation, soil equal in weight to the completed building is removed so that the total load remains the same, and the building settles at the same rate as the surrounding soil.

For more detail on foundations, see Volume Two, pp. VI.K.24-29.

Earthquakes

Earthquakes are a normal part of the geologic process. California and San Francisco are especially prone to earthquakes because of their location along the boundary between two major plates of the earth. Those plates are slowly moving in opposite directions, building up stress as they slide past one another. Earthquakes are caused when stress is suddenly released along a fault.

The San Andreas Fault, an active fault forming the boundary between the North American and Pacific plates, passes about nine miles southwest of Mission Bay. Other active faults in the Bay Area are the Hayward Fault, the Seal Cove-San Gregorio Fault, and the Calaveras Fault.

Comparatively high levels of earthquake activity seem to occur before great earthquakes and diminish afterward. In California and other areas where major plates meet, there is a historic pattern of large and major earthquakes clustering before a great earthquake. After the 1906 earthquake, seismic activity was quiescent until the mid-1950s. Since that time, northern California has been seismically active, suggesting that the Bay Area may again be entering an active stage in the earthquake cycle.

For planning purposes, a magnitude 8.4 earthquake on the San Andreas Fault and a magnitude 6.9 earthquake on the Hayward fault are considered probable. Either would cause very strong to violent groundshaking at Mission Bay. Bay Mud and uncompacted fill materials, such as the sand and rubble underlying much of

1906 Earthquake

The State Commission that investigated the 1906 earthquake reported that the developed portion of Mission Bay north and west of China Basin Channel was one of two areas in the City most damaged by the quake. Its report summarized:

> *"To some extent the earthquake caused damage to buildings and other structures in all parts of the city and county of San Francisco. The whole area [city] was decidedly within the destructive zone. Still, over a large part of this area, far the larger part, the damage was slight in both amount and character . . . There were relatively small districts, however, in which brick and frame buildings of ordinary construction were badly wrecked or quite destroyed. Pavements were fissured, buckled, and arched. Sewers and water-mains were broken. In places, portions of streets were moved laterally several feet out of place. Well-ballasted street-car tracks, equipped with 8, 10, or 11 inch rails, were arched and flexed or thrown into shallow wave forms. The whole land surface, sometimes for several blocks together, was deformed into shallow waves of irregular extension, length, and amplitude. Effects of this degree were pretty closely confined, as has been stated already, to areas of 'filled' or 'made' land."*

Mission Bay, would amplify and prolong the groundshaking. The 1906 earthquake (magnitude 8.3) showed that areas like Mission Bay, including other portions of northeast San Francisco, are relatively susceptible to earthquake damage compared to the City as a whole.

For more detail on earthquakes, see Volume Two, pp. VI.K.11-14.

Secondary Earthquake Hazards

In addition to groundshaking, earthquake-induced ground failure would probably occur in much of Mission Bay and other filled areas in the Downtown & Vicinity. Because of abundant lenses of sand below the shallow water table, those areas are particularly susceptible to liquefaction. Liquefaction causes soil to lose its cohesiveness and behave as a liquid, a phenomenon similar to quicksand. Subsidence, a lowering of the ground surface caused by settlement of the soil, and lateral spreading, the horizontal movement of soil into adjacent areas, could also occur as a result of an earthquake.

Except for the northern corner of Mission Bay, where bedrock is near the surface, liquefaction and settlement would probably occur throughout the Project Area. The area north of China Basin Channel would be at greatest risk from liquefaction. Lateral spreading is most likely within several hundred feet of China Basin Channel.

Liquefaction and rapid subsidence induced by the 1906 earthquake caused buildings to settle and crack, and water mains, pipes, and underground utilities to break. Streets buckled and cracked from lateral spreading that accompanied liquefaction and rapid subsidence.

For more detail on secondary earthquake hazards, see Volume Two, pp. VI.K.14-15.

Earthquake Damage

Buildings constructed on unengineered fill and Bay Mud will shake more than buildings supported by bedrock. In Mission Bay, buildings five stories or higher and constructed on shallow foundations would be most at risk.

Well-designed and carefully constructed buildings can be expected to remain standing after a major earthquake, but the amount of damage from groundshaking would vary. Light metal and wood frame buildings would respond best to groundshaking. Steel frame buildings would perform well, but would suffer somewhat more damage, mostly nonstructural. Reinforced concrete buildings would be more susceptible to damage; tilt-up concrete buildings would suffer the worst damage, especially if walls were poorly secured to foundation and roof. All building types would suffer some damage in an earthquake similar in magnitude to the 1906 earthquake.

In a major earthquake, ground failure and groundshaking would damage roads, bridges, sewers, water mains, utility conduits, and other infrastructure. The San Francisco Bay Bridge and Golden Gate Bridge would probably be closed because of impassable approaches. BART, MUNI, and CalTrain service would be halted. Utility and telephone service would probably be disrupted. Liquefaction, uneven settlement, and lateral spreading could warp and fracture pavement, making travel over roads difficult. After a major earthquake, emergency services would be pushed to their limits; assistance available to Mission Bay would be limited by needs throughout the City.

Access to Mission Bay could be limited, particularly south of China Basin Channel. Although travel over streets could be difficult due to damage and debris, areas north of the channel would probably be accessible to emergency response vehicles. Areas south of the channel would be more difficult to reach. The Third,

Fourth, and proposed Owens Street bridges would be temporarily impassable and Sixteenth Street could be blocked by debris from the elevated I-280 freeway. Third Street would provide access from the south, although it would probably be damaged by soil failure.

Casualties could be caused by collapsing buildings, shattering windows, and falling debris. Buildings under construction are particularly susceptible to structural failure and falling construction equipment and materials. Nonstructural damage, such as sliding furniture and falling objects, could also cause injuries or deaths. The number of earthquake casualties would vary with the intensity of groundshaking and ground failure, time of day, population exposed, and type of construction.

In Alternative A, an early morning (2:00 a.m.) earthquake could cause about five to ten serious injuries or deaths and about 45 to 50 minor injuries to building occupants; casualties from an early afternoon (2:00 p.m.) earthquake would be about double. An early morning earthquake in Alternative B, with more residents to be affected than in the other Alternatives, could cause about 10 to 15 serious injuries or deaths and about 55 to 65 minor injuries. An early afternoon earthquake would cause fewer than 10 serious injuries or deaths and about 35 to 45 minor injuries.

Because the nighttime population in Alternative N would be under 50, casualties from an early morning earthquake would be very low; an early afternoon earthquake would cause about 10 serious injuries or deaths and 50 to 55 minor injuries. Superior building construction using wood or light metal frame rather than steel frame or concrete construction would reduce casualties considerably.

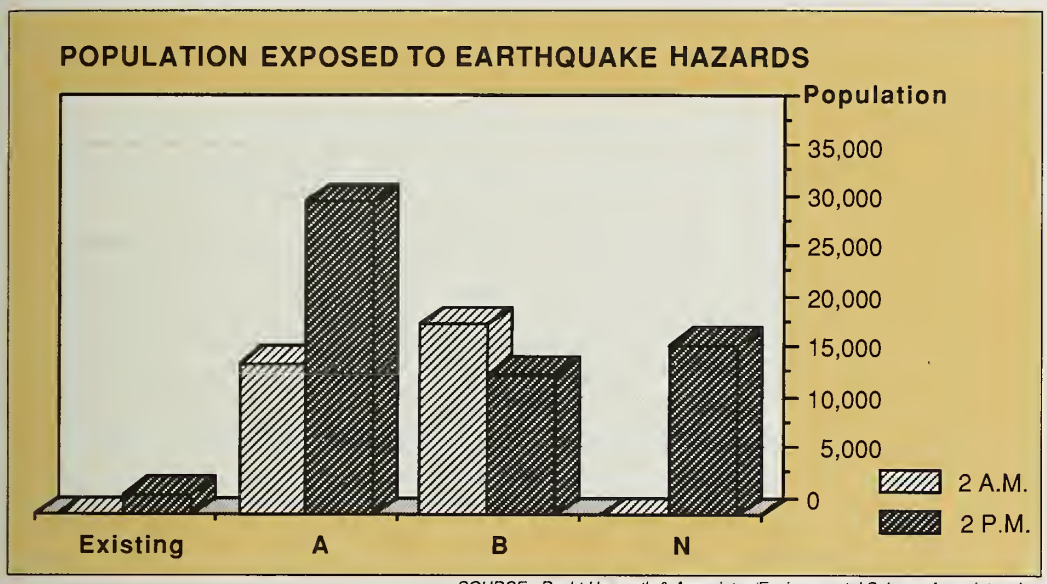
In addition to casualties to building occupants, people outside during an earthquake would be at risk. An earthquake during the evening commute period under any of the Alternatives would cause more casualties, since more pedestrians would be exposed to falling debris.

For more detail on potential earthquake damage at Mission Bay, see Volume Two, pp. VI.K.33-43.

Mitigation Measures

Twenty-four mitigation measures are included. With the exception of one measure applicable only to Alternatives A and N requiring structural reinforcement of Fire Station 30, the mitigation measures apply to all Alternatives. Five measures would mitigate settlement by requiring an engineering investigation of soil properties, using pile-supported buildings where feasible, reusing existing piles where possible, installing leveling jacks as part of shallow foundations, and surcharging (preconsolidating soil by placing additional fill on site before construction). One measure would preclude the need for dewatering during construction by requiring basements to remain above the water table. Another measure would require drainage systems to allow for settlement, and one would test for and mitigate corrosive soils.

Six measures would mitigate groundshaking hazards by adopting building code requirements that are more stringent than the 1987 San Francisco Building Code, restricting exterior building materials to less hazardous types, requiring peer review to ensure that state-of-the-art engineering practices are used, securing material and equipment in buildings under construction, requiring a certified quality assurance / quality control program for construction and materials, and requiring bracing or reinforcement of nonstructural building features. One measure would compact sandy soil to prevent liquefaction and lateral spreading, and another would require automatic shut-off devices on natural gas lines. Five measures would improve emergency response by requiring an emergency response plan for Mission Bay, specifying siting and design fea-



SOURCE: Recht Hausrath & Associates/Environmental Science Associates, Inc.

Figure II.56: Mission Bay Population Exposed to Earthquake Hazards.
The population exposed to earthquake hazards depends on time of day. The population at Mission Bay would represent only a portion of the total population exposed to potential earthquake hazards within the region. The number of earthquake casualties would vary with the population exposed, the intensity of groundshaking and ground failure, and the construction type. Casualties to building occupants in Mission Bay from a 2:00 p.m. earthquake under Alternative A, the worst-case scenario, could include about 95 to 100 minor injuries and 15 to 20 serious injuries or deaths. Under Alternatives B and N, there would likely be fewer casualties.

tures for emergency facilities, requiring a mass care facility in Mission Bay, installing cisterns and pumps to use bay water to increase fire-fighting capabilities, and storing heavy equipment within the Project Area to provide transport, open access, and clear debris after a major earthquake. One measure specifies methods to prevent infrastructure failure during a major earthquake. The final mitigation measure concerns seismic safety and hazardous materials.

See Volume Two, pp. VI.K.45-56, for mitigation measures.

HYDROLOGY & WATER QUALITY

This section addresses China Basin Channel, runoff quantity and quality, groundwater, and wetlands. Water quality in China Basin Channel has been degraded by sewage overflows and industrial activities. Sediments on the channel bottom contain relatively high levels of inorganic contaminants. Runoff from Mission Bay under all Alternatives could be accommodated by the sewer system. Runoff quality could improve with the elimination of existing sources of pollutants, although contaminants such as fertilizers, pesticides, and herbicides from homes and businesses could offset any improvement. Groundwater in Mission Bay is brackish (salty) and potentially contaminated; no uses of Mission Bay groundwater exist or are proposed. Wetlands proposed in Alternative B could be adversely affected by poor water quality.

China Basin Channel

China Basin Channel is the last remnant of the original Mission Bay, a shallow extension of San Francisco Bay surrounded by tidal flats, salt marsh, and sloughs. Water quality in the channel has been degraded by sewage overflows and industrial activities.

San Francisco has a combined sewer system which collects both municipal sewage and stormwater runoff. When the system is overloaded, as during heavy rains, untreated wastewater overflows into China Basin Channel from the Division Street sewer outfall at the southwest end of the channel and at six outfall structures along the channel. Overflows occur about ten times per year, usually in winter and spring. Sewage discharges are diluted and dispersed by channel flow and tidal flushing.

With more residents and employees in the area, public use of the channel would increase, particularly under Alternatives A and B. That could expose additional people to hazards, such as water-borne disease, associated with contact with contaminated water.

Sediments build up on the channel bottom at a rate of about three to six inches per year; without dredging, the channel would eventually develop into mudflats. Sediments on the channel bottom consist of solids from sewage overflows and materials that enter the channel from the Bay. Inorganic contaminants, oil and grease, and chlorinated hydrocarbons adhere to the surface of fine-grained sediments, settling and becoming trapped within the bottom mud rather than being dispersed and diluted in the water. Tests performed in 1979 showed that channel sediments generally had higher levels of inorganic contaminants, such as chromium, copper, lead, and silver, than sediments in other areas of the Bay.

Dredging of 45,000 cubic yards of sediment from China Basin Channel proposed in Alternative A could affect water quality at the dredge site, and, if Bay or ocean disposal were selected, at the disposal site. Dredging would increase the concentration of sediments suspended in the water (turbidity) in both areas for a short time. Contaminants in the dredged materials would probably remain bound to the sediments rather than being released into the water. Disposal of dredge spoils would be regulated by the Environmental Protection Agency and the Army Corps of Engineers. Sediment testing would be required before selection of a disposal site; if testing showed that disposal would have a significant effect on water quality, the dredge spoils would require land disposal.

While wetlands in Alternative B would be created through dry dredging, which takes place on dry land but extends to a sufficient depth to allow flooding, a small amount of wet dredging would be required. Wet-dredging would be

used to open up the wetlands to allow flooding from the Bay.

For more detail on water quality in China Basin Channel, see Volume Two, pp. VI.L.6-11, 22-23, and 27-28. See pp. VI.L.11-12 and Volume Three, Appendix J, Table XIV J.6, for information on channel sediments. See pp. VI.L.24-25 for information on water quality effects of dredging and pp.VI.L.25-27 for information on regulation of dredge spoils disposal.

Runoff

Runoff from most of the Project Area is collected in storm drains connected to the City's combined municipal sewage and stormwater system. Runoff is caused by rainfall on impervious surfaces such as rooftops and paved areas. The amount of runoff would remain about the same under all Alternatives and could be accommodated by the existing sewer system.

Runoff can become contaminated through contact with various chemicals, particularly petroleum products, spilled or dumped on the ground. Contaminants from existing and previous industries, parking, truck traffic, car storage, and railroad activities probably degrade existing runoff quality in Mission Bay. In Alternatives A and B, land uses would change from the predominant heavy industrial and railroad uses to a mixture of residential, commercial, and light industrial uses. Runoff quality could improve with the elimination of existing pollution generating activities in Mission Bay. However, other potential pollutants generated by automobiles, homes, businesses, and landscaping, such as oil, grease, litter, fertilizers, pesticides, and herbicides, would increase. Alternative N would have more industrial uses and thus more potential for the use of hazardous materials.

For more detail on runoff quantity and quality, see Volume Two, pp. VI.L.3-4 and pp. VI.L.15-19.

Groundwater

The groundwater level at Mission Bay generally coincides with the mean water level in adjacent San Francisco Bay, varying from about

SOURCE: Environmental Science Associates, Inc.

Figure II.57: China Basin Channel. *China Basin Channel is the last remnant of the original Mission Bay, a shallow bay surrounded by tidal flats, salt marsh, and sloughs.*

SOURCE: Environmental Science Associates, Inc.

Figure II.58: Division Street Sewer Outfall. *During heavy rains, San Francisco's combined wastewater and stormwater sewer system overflows into China Basin Channel, degrading water quality.*

three to nine feet below the ground surface. The groundwater underlying Mission Bay is brackish (salty) and appears to be contaminated with sewage. Groundwater may also contain traces of soluble metals, petroleum products, or other chemicals deposited on the ground surface or in the soil by past and present industries in the area. There are no current uses of Mission Bay's groundwater, and no future uses are proposed.

Groundwater potentially could be contaminated by toxic pollutants from leaking underground storage tanks or previous industrial activities in and near the Project Area. Metals, petroleum products, and chlorinated hydrocarbons are present in China Basin Channel sediments and may be present in the groundwater. Removal of leaking tanks or contaminated soils could improve groundwater quality; however, there is is some risk of additional contamination from containers ruptured during removal. Further degradation of groundwater quality would probably be reduced under all Alternatives.

A variety of industries could locate in Mission Bay and could potentially use and store hazardous materials. The major potential source of groundwater contamination would be storage of materials in underground tanks, although newer materials and more stringent regulations would reduce the potential for leaks. Spills of hazardous materials, or infiltration of rainfall or irrigation water containing fertilizers, pesticides, or herbicides, could also degrade groundwater quality in the future.

For more detail on groundwater, see Volume Two, pp. VI.L.4-5 and 19-22.

Wetlands

Three wetlands proposed under Alternative B could be affected by poor water quality from sewer outfalls in the channel, urban runoff, or contaminated sediments or groundwater. Under worst-case conditions, poor water quality or inadequate tidal flushing and circulation would interfere with wetland development.

Wetlands could improve some aspects of water quality by trapping pollutants. The mid-channel wetland, inland from the Bay and connected to China Basin Channel, would have the poorest water quality and circulation and thus may be less viable than the other proposed wetlands.

Sedimentation and vegetation encroachment would eventually cause wetlands to evolve from mud flats to salt marsh, unless steps were taken to prevent their conversion.

For more detail on water quality effects on wetlands, see Volume Two, pp. VI.L.30-34.

Mitigation Measures

Fourteen mitigation measures related to hydrology and water quality are included. Four measures apply to construction and dredging: one would reduce the potential for erosion of soil storage piles or surcharges in all Alternatives by installing filter fences, planting vegetation, or covering the soil; three measures would reduce dredging impacts in Alternatives A and B by scheduling dredging at times when impacts would be the least adverse and employing specific dredging techniques. One measure, applicable to all Alternatives, would reduce the amount of runoff from Mission Bay through various design measures. Two measures, applicable to all Alternatives, would reduce runoff impacts on water quality by requiring sediment and grease traps in stormwater intakes, street sweeping, and minimizing the use of pesticides and herbicides. Four measures would contribute toward the successful creation of wetlands in Alternative B by requiring studies of each wetland site, cleanup of surface or groundwater contamination that would interfere with wetlands, design measures to ensure proper drainage and flushing of wetlands, and measures to prevent urban runoff from entering wetlands. The last three measures apply to all Alternatives, and involve the investigation of potential groundwater contamination prior to site development, use of corrosion-resistant pipes and underground storage tanks, and installation of railings and warning signs to discourage direct contact with water in China Basin Channel.

See Volume Two, pp. VI.L.36-40, for mitigation measures.

VEGETATION & WILDLIFE

This section describes plants and animals in the Project Area, creation of wetlands and other wildlife habitat, and potential impacts on aquatic life in China Basin Channel. There are no rare or endangered plants or fish in the Project Area; the California brown pelican, an endangered species, is occasionally present in the area but probably would not be adversely affected. Three wetlands created in Alternative B would provide valuable wildlife habitat; no wetlands would be created in the other Alternatives. Under all Alternatives, landscaped open space would provide habitat for animals that are relatively tolerant of human activities. Dredging in China Basin Channel proposed in Alternative A could have local effects on aquatic life at both the dredge site and the disposal site. Dredging could adversely affect Pacific herring spawning at the mouth of the channel if it occurred during the peak spawning season.

Wetlands

Wetlands, once common along the shoreline of San Francisco Bay, are now a scarce resource. Wetlands provide valuable wildlife habitat and play an important role in the Bay's ecosystem. Plants and invertebrates, such as clams and worms, that inhabit mudflats and tidal marshes are a food source for juvenile fish, waterfowl, and shore birds. Wetlands are used extensively as nursery grounds for many commercially and ecologically important fish species, which are in turn preyed upon by waterfowl and shore birds.

Alternative B would create three tidal wetlands, totalling 33.8 acres. Each wetland would contain mudflats, salt marsh, and an island. The mudflats and salt marsh would provide feeding and resting sites for wading birds and shore birds, such as great blue herons, great egrets, black-crowned night herons, snowy egrets, killdeer, sandpipers, and sanderlings. Islands would provide protected habitat and could be used for roosting. The mid-channel wetland along China Basin Channel west of Fourth Street would be created by 2000. By 2020, two additional wetland areas along the eastern edge of the Project Area would be created: the bayfront wetland, between Piers 52 and 64, and the China Basin wetland, between the mouth of the channel and Pier 48. No wetlands would be created under Alternatives A or N.

For more detail on wetlands proposed under Alternative B, see Volume Two, pp. VI.M.9-13 and 17-20.

Other Wildlife Habitat

No rare or endangered plants have been identified within the Project Area. The California brown pelican is the only rare or endangered wildlife species present in the area and is not likely to be adversely affected.

Mission Bay's urban character and lack of vegetation limit its existing value to wildlife. Landscaped open space, providing potential wildlife habitat, would vary by Alternative (43.3 acres for Alternative A, 45.3 acres for Alternative B, and 5.2 acres for Alternative N). Open space would be urban in character, with lawns, shrubs, trees, gardens, and playing fields, rather than natural and untended, but would provide habitat for animals tolerant of human activities. The park-like open space would attract a variety of land birds, including pigeon (rock dove), mourning dove, American robin, northern mockingbird, European starling, brown towhee, white-crowned sparrow, Brewer's blackbird, house finch, and house sparrow. Open areas would provide feeding, roosting, and breeding habitat for those species. Non-native species such as pigeon, European starling, and house sparrow would be the most common.

SOURCE: Environmental Science Associates, Inc.

Figure II.59: Cormorant, China Basin Channel. *China Basin Channel is used by a variety of gulls and water birds. Bird use of the channel would continue under all Alternatives.*

Other animals inhabiting the park areas would include black rat, roof rat, house mouse, pocket gophers, California slender salamander, and western fence lizard, all common to urban open space in the Bay Area.

The open water in China Basin Channel would continue to provide feeding and resting habitat for common gulls and water birds under all Alternatives. Typical species expected to use the channel are Western grebe, Western gull, California gull, cormorant, mallard, cinnamon teal, and lesser scaup. Foraging by herons and egrets along the channel shoreline would be substantially reduced or eliminated by increased activity near the channel in Alternatives A and N. The relatively small number of displaced birds would forage in other parts of the Bay Area. Herons and egrets are expected to forage along the shoreline and in the adjacent wetland in Alternative B.

Harbor seals would probably not use the open water habitat provided by China Basin Channel because of boating and other human activity. They would probably continue to feed occasionally near the mouth of the channel.

For more detail on existing vegetation and wildlife in the Project Area, see Volume Two, pp. VI.M.1-3. See pp. VI.M.7-13 for information on wildlife habitat under each Alternative.

Aquatic Life

No rare or endangered fish are known to inhabit the waters of China Basin Channel or San Francisco Bay near the Project Area. Lagoons associated with wetlands proposed under Alternative B would provide additional habitat for aquatic life.

Alternative A would dredge China Basin Channel to improve its navigability. Dredging would temporarily increase the amount of sediment suspended in the water (turbidity), potentially disrupting feeding and respiration of inverte-

brates and fish. While some fish would die because of dredging, large fish kills would not result, and fish at the mouth of China Basin or in the Bay would not be at risk.

The bay shoreline east of the Project Area and the mouth of China Basin Channel provide suitable spawning habitat for the Pacific herring. The Pacific herring fishery is one of the last remaining commercial fisheries in San Francisco Bay. The fishery specializes in herring roe, which is exported to Japan as a delicacy. If dredging occurred during the peak herring spawning season (December to March), it could adversely affect the local Pacific herring fishery. Herring deposit large masses of eggs on aquatic vegetation and hard substrates, such as rip-rap and pilings. Because of the adhesive nature of the eggs, suspended particles, such as those created by dredging, stick to the eggs and can smother them. High turbidity levels can also cause gill abrasion, clogged gills, and suffocation in adult herring. Loss of eggs and adult herring could potentially reduce herring populations and future catches.

No dredging of China Basin Channel is proposed for Alternatives B and N. Dry-dredging, which takes place on dry land but extends to a sufficient depth to allow flooding, would be used to create the wetlands proposed under Alternative B; however, a small amount of wet dredging would also be required. Wet dredging would be used to open up the wetlands to allow flooding from the Bay.

For more detail on aquatic life, see Volume Two, pp. VI.M.4-6 and 14-20.

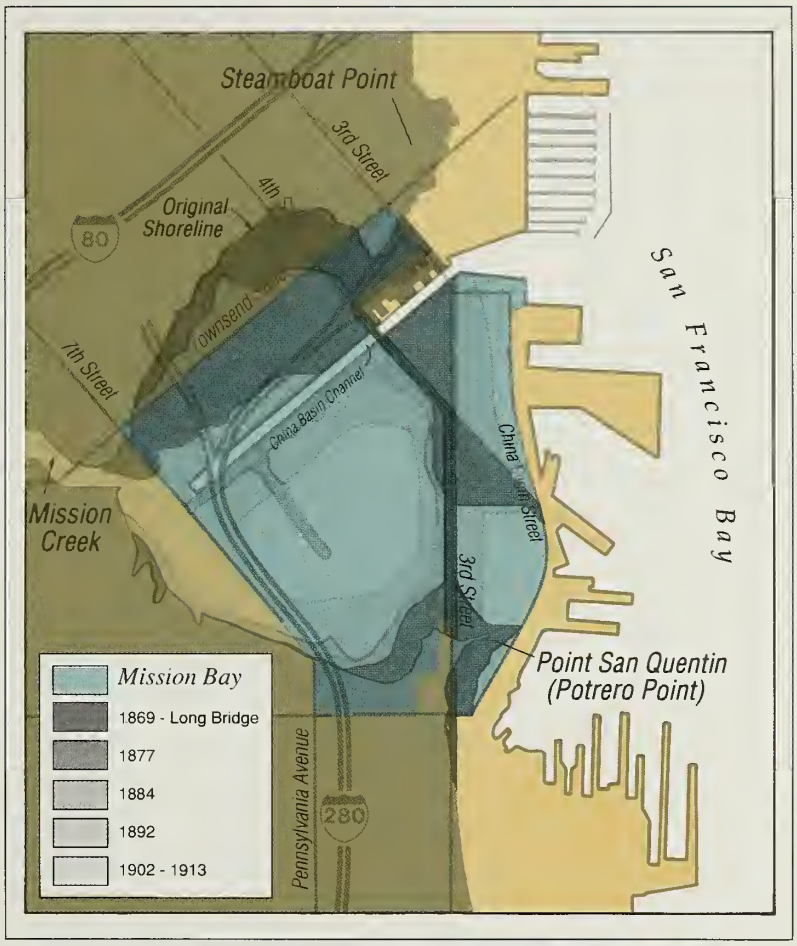
Mitigation Measures

Sixteen mitigation measures are included. Three measures apply to all Alternatives and would encourage wildlife to use landscaped open space by ensuring prompt planting of vegetation, specifying useful types of vegetation, and providing buffers between open space and areas of high activity. One measure applies only to Alternative A and would consolidate small open space areas into larger ones, increasing their value to wildlife. Nine measures apply to Alternative B and would contribute toward the successful creation of wetlands and increase their value to wildlife by consolidating wetland areas, specifying design features and vegetation types, and establishing a monitoring program. One mitigation measure for Alternatives A and B limits dredging to between March and November to eliminate any impact on the Pacific herring fishery. Two mitigation measures regarding wetlands and aquatic life would apply only to Alternative B.

See Volume Two, pp. VI.M.21-25, for mitigation measures.

HAZARDOUS WASTES

This section addresses the potential for hazardous waste contamination in the Project Area. It discusses the filling of Mission Bay, underground storage tanks, previous and existing industries, surface conditions, types of hazardous materials potentially present, implications for development, and potential health risks. Mission Bay's history suggests a possibility of hazardous waste contamination in some areas, although that has not been confirmed by soil or groundwater testing. Sources of contaminants could include contaminated fill materials, leaking underground storage tanks, or hazardous materials spilled or disposed of by industries in the area. Surface conditions also indicate the potential for contamination, since surface staining, trash, and debris are common in open areas. Some toxic materials persist in the environment and could still be present in soil or groundwater, while others would no longer be hazardous unless sealed in containers. If not located and cleaned up, contaminants could present health risks to construction workers or occupants. The draft Mission Bay Project Hazards Mitigation Program, a background document for the EIR, addresses hazardous materials in more detail, outlines an investigation program, and provides a framework for any necessary clean-up.



SOURCE: Environmental Science Associates, Inc./ David Chavez & Associates

Figure II.60: The Filling of Mission Bay. *Mission Bay was gradually filled in the late 1800 s and early 1900 s. Sources of fill included local sand hills, trash from the city dump on the northern shoreline of Mission Bay, and rubble and debris from the 1906 earthquake and fire.*

Filling Mission Bay

Originally a shallow extension of San Francisco Bay, Mission Bay was gradually filled in the late 1800s and early 1900s. The filling began between 1859 and 1869, when areas north and west of Steamboat Point (near present-day King Street, between Third and Fourth Streets) were levelled to fill the nearby shoreline.

In 1869, Long Bridge was constructed to connect Steamboat Point on the northern edge of Mission Bay with San Quentin Point on the southern edge, roughly along the alignment of present-day Third Street. The expanse of open water decreased as filling continued through the late 1800s.

During the late 1800s, the area south of Berry Street between Sixth and Seventh Streets was used as the city dump; up to 300 wagon loads of trash and garbage per day were shoveled into the waters of Mission Bay. By 1892, fill had enclosed Mission Bay, shutting off tidal flushing from San Francisco Bay. After the 1906 earthquake and fire, building rubble and debris were transported by rail to Mission Bay to complete the filling.

Figure II.61: Arctic Oil Works.
Arctic Oil Works, which primarily handled whale oils, operated in the southeastern portion of Mission Bay during the late 1800 s. Union Oil of California followed in the same location, operating until 1969. Petroleum products were stored at eight locations in Mission Bay. The area has a history of industrial use, raising the possibility of hazardous waste contamination.

Courtesy, The Bancroft Library

Soil borings in Mission Bay show the low-quality, heterogeneous artificial fill used in the area. Fill materials, often in two or three distinct layers from different periods or types of fill, are up to 20 feet thick. Brick, wood, organic material, concrete, slag, glass, clay, shells, oil-contaminated sand and silt, asphalt, porcelain, metals, cinder, and cement have all been encountered in Mission Bay soil borings.

For more detail on sources and progression of fill, see Volume Two, pp. VI.N.5-7. See pp. VI.N.7-8 for information on soil borings.

Underground Storage Tanks

There have been about 49 underground storage tanks in the Project Area, although many have been removed. They are important because of their potential to leak contaminants into soil or groundwater. Additional underground storage tanks are near Mission Bay. Most tanks probably contained gasoline or diesel fuel and are at least 15 years old. Because of tank age, corrosive soil, and brackish groundwater, petroleum products probably have leaked from some of the tanks.

For more detail on underground storage tanks, see Volume Two, pp. VI.N.8-9.

Previous Industries

The industrial development of Mission Bay generally followed the pattern of land filling, beginning along the margins and working toward the center. A variety of industries occupied Mission Bay, including petroleum blending and storage, paint products, glass manufacturing, chemical manufacturing, shipyards, steel mills, asbestos storage, rail yards, lumber yards, brick and hay storage, tanneries, warehouses, planing mills, wood products manufacturing,

brick manufacturing, and gas plants. While some pose little threat of contamination, others could have spilled or dumped toxic contaminants in the Project Area.

For more detail on previous industries, see Volume Two, pp. VI.N.9-14 and Figures VI.N.2-4, pp. VI.N.22-24.

Existing Industries

Mission Bay is still used for a variety of industrial activities. Two industries in the Project Area are registered hazardous waste generators. Other firms, while not requiring registration under the Resource Conservation and Recovery Act, are likely to handle small to moderate quantities of hazardous materials. Twenty-four establishments involved in paint and varnish manufacturing, electroplating, ship building and repair, warehousing, petroleum gas distribution, or sewage systems are in or near Mission Bay. Vehicle repair facilities, body shops, vehicle storage, printing and lithography shops, oxygen and flammable gas sales, scrap metal sales, paint shops, and trucking companies probably store and use smaller quantities of hazardous materials.

For more detail on existing industries, see Volume Two, pp. VI.N.14-16.

Surface Conditions

There is widespread petroleum staining of surface soil in Mission Bay. Staining along rail lines is common, but is probably shallow and local. Other stained areas are present, possibly from illegal dumping. The most apparent surface contamination is at Sixth Street Auto, an abandoned garage, where soil is thoroughly oil soaked.

Rail yards in Mission Bay are generally devoid of vegetation, suggesting that they may have been regularly treated with oil, salt, or other chemicals to prevent weeds. Vacant lots in Mission Bay commonly contain trash, barrels, and other waste materials.

For more detail on surface conditions, see Volume Two, pp. VI.N.16-17.

Types of Hazardous Materials

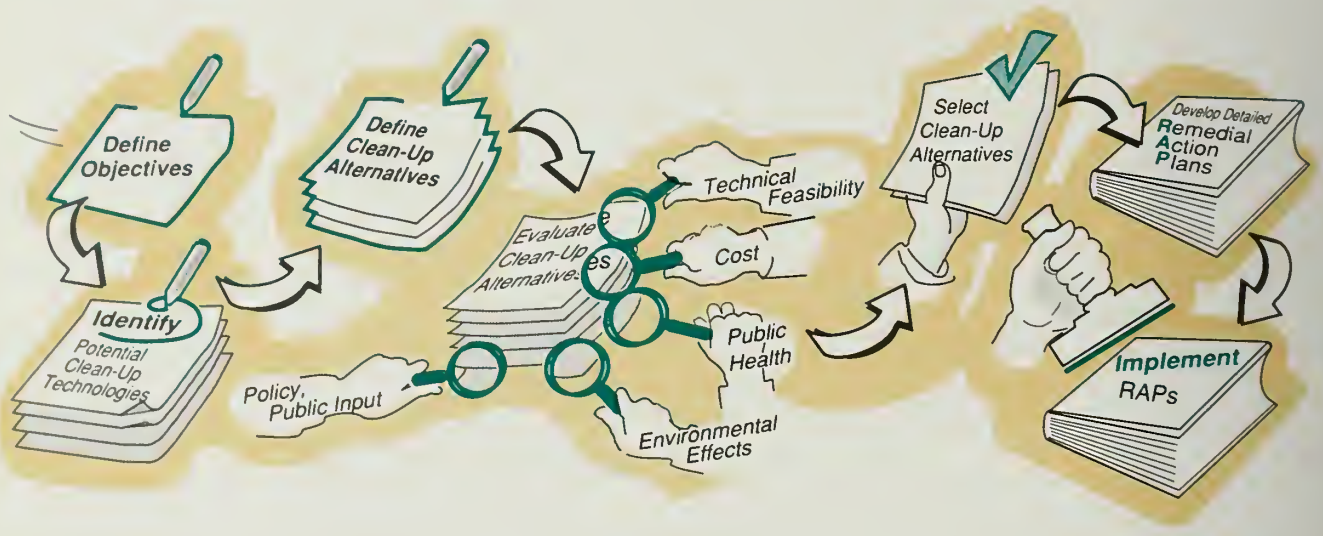
Hazardous materials are reactive, ignitable, corrosive, or toxic. Mission Bay potentially contains hazardous substances with any of those properties, although toxics are most likely because they are generally more persistent in the environment.

Reactive materials can explode or exhibit other types of violent chemical behavior. Because of their reactivity, reactive materials are probably not present unless in tightly sealed containers.

Ignitable materials can be set on fire, can burst into flame spontaneously, or can be ignited through interaction with another substance. Industrial solvents, fuels, and fuel additives are potential ignitable contaminants in Mission Bay. Because ignitable materials generally are volatile, they would not persist at or near the ground surface in appreciable quantities unless stored in sealed containers. However, underground contaminants could persist for years, possibly contaminating groundwater.

Corrosive substances dissolve other materials. As with reactive and ignitable contaminants, corrosive materials would probably not persist in the Project Area unless in sealed containers.

Toxic materials include both acute and chronic toxics. Acute toxics can cause harm through a single, short-term exposure. Chronic toxics cause harm through prolonged or repeated exposure. Toxics are the largest and most hazardous group of substances potentially present in Mission Bay. They include flammable liquids, acids, metallic contaminants, pesticides, herbicides,



SOURCE: Environmental Science Associates, Inc.

Figure II.62: Remedial Action Process. *Should portions of Mission Bay require hazardous waste clean-up, it would follow an orderly process in Alternatives A and B. Remedial Action Plans would be implemented in phases coinciding with development. Lacking a coordinated development approach, clean-up under Alternative N would proceed on a piecemeal basis.*

asbestos, creosote, and PCBs. Some are quite persistent in the environment, particularly metal compounds, pesticides, asbestos, and PCBs. Some toxics are soluble enough to contaminate groundwater, while others can be ingested by animals and concentrated in the food chain.

For more detail on the types and environmental fates of potential contaminants, see Volume Two, pp. VI.N.18-21 and 25-27.

Implications for Development

Because Mission Bay's history indicates the potential for hazardous waste contamination, San Francisco Ordinance 253-286 (Hazardous Soils Analysis) requires that soil throughout the Project Area be tested prior to obtaining building permits.

Some of the surface soil in the Project Area could be contaminated to levels requiring either treatment or removal from the site. All three Alternatives involve the excavation of large amounts of surface soil. Subsurface soil, groundwater, or channel sediments could also be contaminated. Large amounts of subsurface excavation are required for Alternatives A and B. Alternative A involves dredging China Basin Channel.

The three clean-up options for hazardous materials are on-site treatment and disposal, on-site internment, and off-site disposal. Until recently, off-site disposal was the only option for most wastes. Technologies to extract or decontaminate hazardous materials on-site are developing rapidly and merit serious consideration in the future. On-site internment (for example, sealing contaminated soils under a relatively impermeable clay cap) may not be a permanent solution and could merely postpone treatment or disposal.

Under all Alternatives, portions of the site proposed for development and appropriate buffer zones will be investigated, and any necessary clean-up will be completed before development begins. Clean-up of any hazardous materials would be guided by federal, state, and local laws.

The draft Mission Bay Project Hazards Mitigation Program, a background document for the EIR, addresses hazardous materials in more detail and includes a parcel-by-parcel summary of industrial activities, information from

soil borings, discussion of site investigation and clean-up approaches, recommendations for additional investigation, and a framework for the phasing of any necessary clean-up.

The draft Mitigation Program presents a framework for further site investigation and clean-up under Alternatives A and B. It provides for a broad-brush areawide survey of the Project Area, and detailed sampling and testing of each development phase area and its buffer zone prior to development of the phase. Site clean-up activities would be isolated as much as possible from other activities. A safety buffer zone would be maintained between clean-up activities and construction zones or occupied areas throughout all phases of project development.

For more detail on hazardous waste clean-up, see Volume Two, pp. VI.N.27-32.

Health Risks

Of the four types of hazardous materials, toxic materials pose the most risk. Toxics are poisons that are hazardous to both humans and wildlife. If not located and cleaned up, toxics could pose long-term health hazards to cleanup crews and construction workers, as well as future residents, workers, and visitors. Recreational open space and residential areas would be most susceptible to adverse effects from hazardous materials. Wildlife would be at risk from hazardous materials as well, either through direct contact or through their food supply. Commercial and industrial uses would be less sensitive to hazardous waste contamination.

Clean-up of hazardous materials would have public health impacts, depending on the nature and amount of contaminants and the period of clean-up. Clean-up crews and transporters would face direct risks; indirect risks to nearby residences, businesses, and wildlife could also occur through contact with the materials at the site or in transit. Without clean-up, existing health hazards, if any, would remain indefinitely. Similarly, any undetected hazardous materials would pose a continuing, long-term risk to construction workers, occupants, visitors, or wildlife.

As integrated development programs, Alternatives A and B would provide an opportunity for a comprehensive site investigation and clean-up program. Alternative N would be developed in a piecemeal fashion and, while individual construction sites would be tested under the Hazardous Soils Analysis Ordinance, the potential for contact with undetected hazardous wastes would be higher. Lacking a coordinated approach to site investigation and clean-up, conflicts between clean-up activities and Mission Bay occupants would also be greater in Alternative N than in Alternative A or B.

For more detail on health risks, see Volume Two, pp. VI.N.32-38.

Mitigation Measures

Five mitigation measures related to hazardous wastes are identified. Three measures, applicable to Alternatives A and B, propose a broad-brush areawide survey consisting of surface soil and soil gas sampling prior to the beginning of the first phase of development, detailed surveys and clean-up prior to each phase of development, and a coordinated site remediation program for sites found to be contaminated. Those three measures are based on the Mission Bay Project Hazards Mitigation Program. The fourth measure recommends a coordinated approach to site investigation and clean-up for Alternative N as in Alternatives A and B, but recognizes that without a coordinated development plan, cleanup in Alternative N would proceed under existing laws and regulations as individual parcels were developed. The final measure, applicable to all Alternatives, outlines safety measures to be implemented at clean-up sites to protect clean-up workers and nearby employees and residents from potential hazardous dust and toxic gas releases.

See Volume Two, pp. VI.N.39-45 for mitigation measures. The Mission Bay Project Hazards Mitigation Program, on file at the Department of City Planning, also contains more detailed information.

CONSTRUCTION

This section addresses construction-related impacts on employment, transportation, air quality, noise, energy, geology, hydrology and water quality, vegetation and wildlife, and hazardous wastes. Measures to mitigate those impacts are included. Construction of Mission Bay would take place over a 30-year period. Construction would provide jobs, increase vehicle trips, raise dust, generate noise, consume energy, involve excavation and dredging, and expose soil to erosion. Construction could require clean-up of hazardous wastes. Usually dismissed as short-term impacts, construction impacts from Mission Bay would have long-term effects on the Project Area.

Employment

Development of Mission Bay would provide construction jobs. Construction would require skilled and unskilled workers as well as management and supervisory personnel. The 30-year construction program would provide workers with an opportunity for training and career advancement. Alternative A would provide jobs for the most construction workers, about 13,000 person-years in total. Alternative B would provide about 80% of that amount, while Alternative N would provide about 30%.

For more detail on construction employment, see Volume Two, pp. VI.B.88-90.

Transportation

Construction would increase vehicle trips to and from Mission Bay. Trucks would move excavated soil and deliver construction materials. Construction workers would commute via automobile.

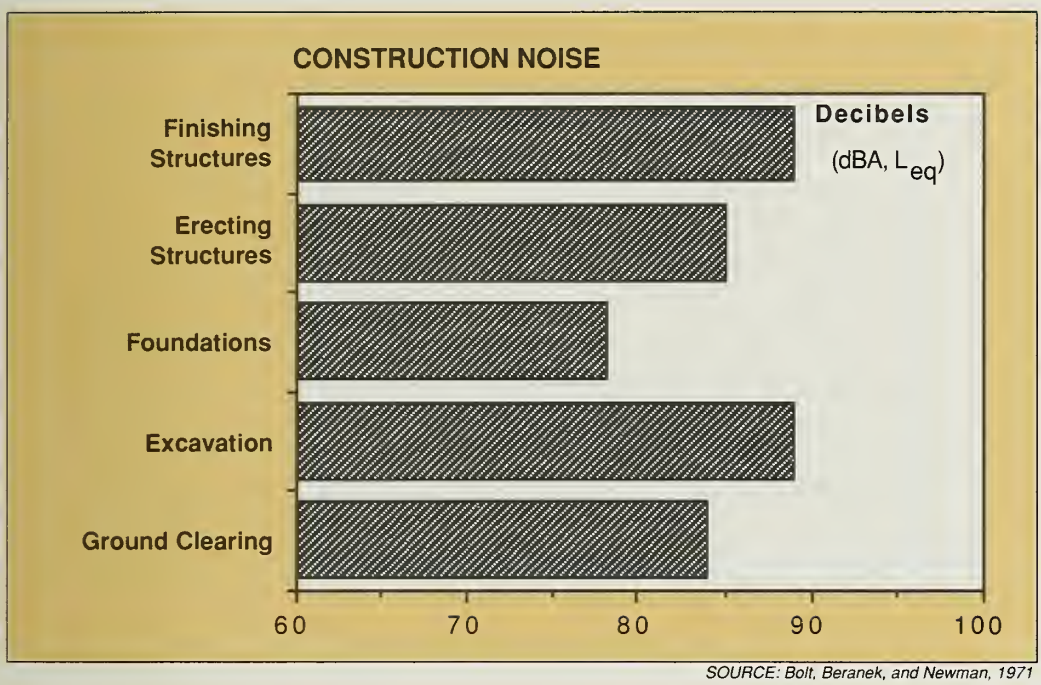
Truck traffic would be fairly steady over the build-out period, but would vary locally with the specific construction involved. Truck traffic would reduce street capacity and temporarily block traffic lanes. The primary access route to and from Mission Bay would be the Bayshore Freeway via I-280 and Mariposa Street. Fewer trucks would travel via the Fourth and Fifth Street ramps to I-80. Changes in intersection levels of service cannot be quantified because they would depend on the amount and nature of construction occurring at any one time.

For more detail on construction impacts on transportation, see Volume Two, pp. VI.E.188-189.

Air Quality

Demolition, excavation, and construction would raise dust. Relatively large dust particles would settle out of the air close to the construction site; smaller particles would remain suspended in the air. Dust would contain particles less than 10 microns in diameter (PM_{10}), and site development under all Alternatives would likely cause local violations of state and federal 24-hour particulate standards. Emissions of nitrogen oxides, carbon monoxide, sulfur dioxide, hydrocarbons, and particulates by diesel-powered construction equipment would be less important. Architectural coatings, particularly solvent-based coatings for steel beams and exterior wood surfaces, would emit hydrocarbons as they dried.

Dust could contain toxic constituents from soil contaminated by past industrial use or from contaminated fill material, potentially causing health impacts through inhalation, skin contact, or ingestion of dust. Gaseous emissions of methane and carbon dioxide, generated by decaying fill material, could pose fire, explosion, or asphyxiation hazards during construction. Potential air quality hazards would primarily affect construction workers.



SOURCE: Bolt, Beranek, and Newman, 1971

Figure II.63: Typical Construction Noise Levels at 50 Feet. *Construction noise levels vary with the phase of construction, as well as with distance from the construction site. Noise levels would decrease by about six dBA with each doubling of distance from the construction site. See Figure II.38 for examples of familiar noise levels for comparison.*

Odors from former landfill areas and bay muds may be released during excavation and construction, a potential temporary annoyance to residents and construction workers.

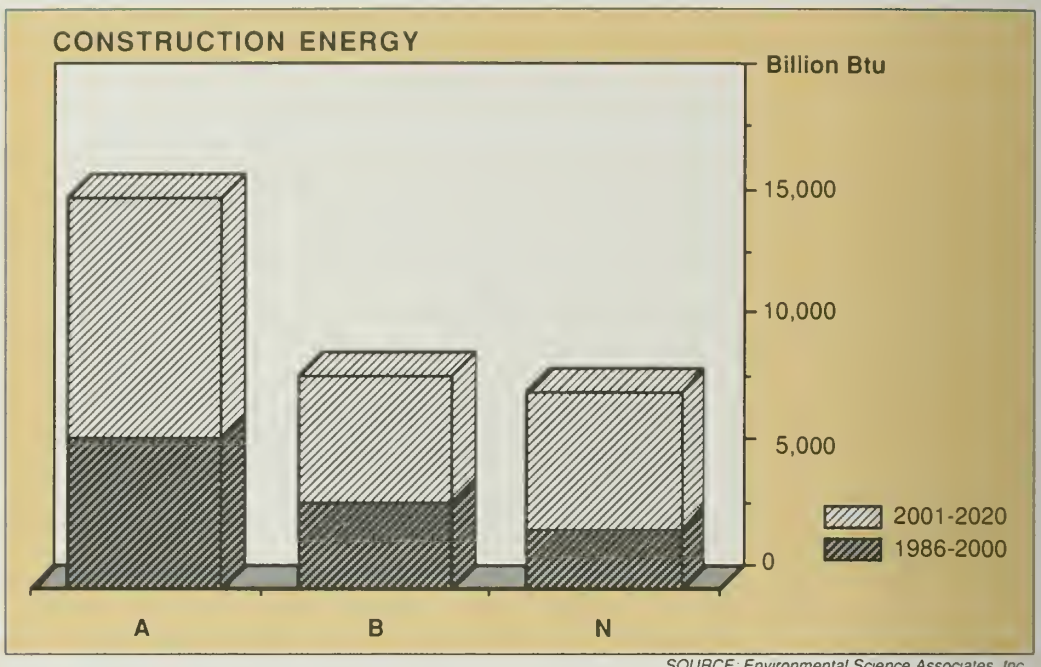
For more detail on construction impacts on air quality, see Volume Two, pp. VI.F.11-12.

Noise

Construction noise would disturb nearby employees and residents, including the houseboat community, as well as occupants of early phases of Mission Bay. Construction noise levels would vary with the type and location of construction activity, and the construction methods and equipment used. Construction noise would be reduced by distance and intervening buildings; general construction noise would probably not be recognizable several hundred feet from the construction site.

Short-term construction noises, such as noise from pile driving or individual pieces of construction equipment, would be heard over greater distances than general construction noise, but would be less frequent. Pile driving would be the loudest construction noise and could be heard as far away as Rincon Hill to the north, Howard Street to the northwest, U.S. 101 to the west, and 23rd Street to the south. With open windows, instantaneous indoor noise levels at practically any location within Mission Bay could exceed 85 dBA during pile driving, which would be very annoying and could disrupt normal activities. Pile driving typically occurs for about five to ten minutes out of an hour so the noise would not be continuous, but the repetitive nature of the noise and the accompanying vibrations would disturb remaining tenants and any new residents or employees.

Construction noise would be similar under all Alternatives. Differences in impacts would result primarily from the locations of construction sites, timing and extent of construction, and location of residents. With no new housing, Alternative N would have the least construction noise impacts on Mission Bay residents.



SOURCE: Environmental Science Associates, Inc.

Figure II.64: Construction Energy Consumption Through Build-Out. *Total construction energy (shown in Btu) would equal about 2.7 million barrels of crude oil for Alternative A, 1.5 million barrels for Alternative B, and 1.4 million barrels for Alternative N.*

Construction noise levels perceived outside of the Project Area would vary according to construction proximity and phasing. Noise from trucks hauling excavated material would primarily affect existing land uses along Third and Mariposa Streets, the main access route to and from I-280 to U.S. 101. Shipments from the East Bay would arrive via the Fourth and Fifth Street ramps.

Construction noise 100 feet away from construction sites could exceed 80 dBA, L_{eq}, potentially violating San Francisco Noise Ordinance standards, thus requiring noise abatement measures.

For more detail on construction noise, see Volume Two, pp. VI.G.11-18.

Energy

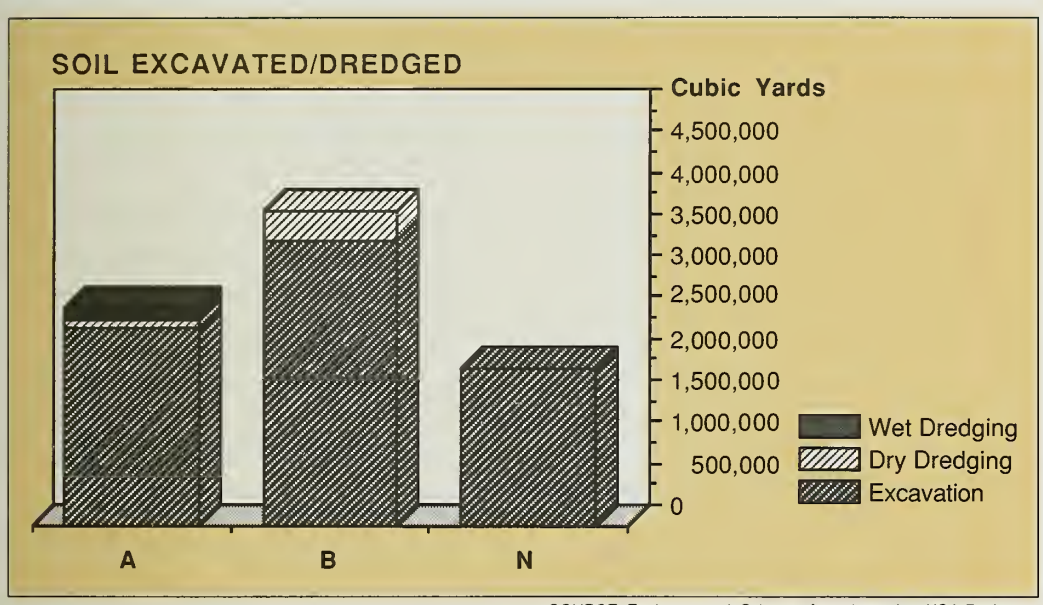
Construction of buildings, streets, sewers, and other facilities would require a large initial investment of energy. Construction expends energy both directly and indirectly. Construction equipment consumes energy directly; energy used to produce construction materials is indirect energy. About one-quarter of total construction energy is direct energy, while three-quarters is indirect energy.

For more detail on construction energy, see Volume Two, pp. VI.H.7-8, and Volume Three, Appendix H, Tables XVII.2-4.

Geology

A large volume of soil would be excavated to construct building foundations under all Alternatives. Sediment would be dredged from China Basin Channel in Alternative A. Dry dredging, which takes place on dry land but extends to a sufficient depth to allow flooding from the Bay, would be used to create wetlands in Alternative B. Excavated material and dredge spoils would require disposal. Dredge spoils from China Basin Channel, and possibly dry dredge spoils and excavated materials, could require special handling and disposal if contaminated by hazardous waste.

Surcharging, the placement of additional fill on building sites to preconsolidate sediment and



SOURCE: Environmental Science Associates, Inc./KCA Engineers

Figure II.65: Volume of Excavation and Dredging by Build-Out. *Soil would be excavated to construct building foundations (about 2.4 million cubic yards in Alternative A, about 3.4 million cubic yards in Alternative B, and about 1.9 million cubic yards in Alternative N). In Alternative A about 135,000 cubic yards of sediment would be dredged from China Basin Channel by build-out, and about 85,000 cubic yards of dry dredging would improve its edges. About 380,000 cubic yards of dry dredging would create wetlands under Alternative B.*

reduce settlement after construction, could be used at Mission Bay. Two to five feet of soil would be placed on and around building sites, remaining for up to two years. After surcharging, clean fill would be added if necessary to restore the original elevation of the ground surface.

If excavation extends below the water table, dewatering would be required. Dewatering would increase settlement in surrounding areas, possibly affecting adjacent structures. The sidewalls of any excavation would require reinforcement to avoid collapse.

As in other areas of the City, should an earthquake occur during construction, partially completed structures could be severely damaged, excavations could fail, and unsecured construction equipment or building materials could fall. An earthquake during working hours would place construction workers and pedestrians at risk.

For more detail on excavation and dredging volumes, disposal of excavated and dredged material, and surcharging, see Volume Two, pp. VI.K.19-23. See pp. VI.K.32-33 for information on dewatering. See p. VI.K.39 for a discussion of earthquake hazards during construction.

Hydrology & Water Quality

Site clearance, grading, and cut and fill operations would expose large areas of Mission Bay to erosion. Severe erosion could occur if soil were stored on site or if surcharging were used. Soil deposited on roads and surrounding areas by construction activity could be washed into storm drains by rainfall or water used to wash down building sites. Soil erosion and spills would increase the concentration of suspended sediments in China Basin Channel and the sewer system if not intercepted by catch basins, possibly violating San Francisco Regional Water Quality Control Board criteria.

Erosion or spills of contaminated soil could deposit contaminants in the sewer system, channel, or Bay. If excavation encountered and ruptured unidentified underground storage tanks, hazardous materials could be released into the soil and eventually enter the groundwater.

About 240 acres would be cleared for development under Alternatives A and B; about 200 acres would be cleared under Alternative N. Less erosion, and thus less-severe sediment-

related water quality impacts, would occur under Alternative N.

Alternative A includes initial dredging of 45,000 cubic yards of sediment from China Basin Channel to improve its navigability. Dredging of a similar amount could be required about every ten years. Dredging would last about two months. Dredging would temporarily increase concentration of suspended sediment (turbidity) both at the dredge site and disposal site. Turbidity levels would return to normal after several hours. Dredging could cause temporary violations of state water standards for turbidity and dissolved oxygen and could disturb aquatic life. Dredging within the channel would probably not affect the Bay.

Tests of channel sediments in 1979 showed that they generally had higher levels of inorganic contaminants than sediments in other areas of the Bay. Toxic contaminants in sediment, such as lead and chlorinated hydrocarbons, could be released during dredging and disposal of dredge spoils. Most of the contaminants, however, would remain in the sediment. Disposal of dredge spoils would be regulated by the Environmental Protection Agency and the Army Corps of Engineers. Further sediment testing would be required to select an appropriate disposal location. If contaminant levels in channel sediments were too high to allow disposal at a bay or ocean disposal site, disposal of dredge spoils on land would be necessary.

Alternative A would involve dry dredging (excavation) along China Basin Channel to improve the appearance and stability of its edges. Construction of wetlands under Alternative B would require dry dredging near the channel and the Bay. Excavation in those areas would increase the amount of sediment that could enter the channel or Bay, thus increasing suspended sediment concentrations.

Dewatering, either during excavation or in clean-up of groundwater contaminated with hazardous wastes, could cause additional salt water intrusion as water from the Bay flowed in to replace the extracted water.

For more detail on erosion and associated water quality impacts, see Volume Two, pp. VI.L.14-15. See pp. VI.L.24-29 for water quality effects of dredging.

Vegetation & Wildlife

Dredging under Alternative A would temporarily increase the amount of sediment suspended in the water (turbidity), potentially disrupting feeding and respiration of invertebrates and fish. While some fish would die because of dredging, large fish kills would not result, and fish at the mouth of China Basin or in the Bay would not be at risk.

If dredging occurred during the peak herring spawning season (December through February), it could adversely affect the local Pacific herring fishery. High turbidity levels could smother herring eggs and cause gill abrasion, clogged gills, and suffocation in adult herring.

Construction in and around China Basin Channel, either by dredging in Alternative A or construction of wetlands in Alternative B, would temporarily disrupt birds in those areas.

For more detail on the impacts of dredging on wildlife, see Volume Two, pp. VI.M.14-15.

Hazardous Wastes

Mission Bay could be contaminated by hazardous wastes from fill materials, leaking underground storage tanks, or materials spilled or disposed of by industries in the area. If present, hazardous wastes would be cleaned up according to federal, state, and local regulations.

Should hazardous materials require off-site disposal, trucks carrying hazardous wastes would be routed down major arterial streets to the nearest freeway ramps. They could travel via Third, Brannan, and Fifth Streets to the Bay Bridge I-80 ramp at Fifth and Bryant Streets, via Third and Brannan Streets to the I-280 ramp at Sixth and Brannan Streets, or via Third and Mariposa Streets to I-280.

Clean-up of hazardous materials would have public health impacts, depending on the nature and amount of contaminants and the duration of clean-up. Clean-up crews and waste transporters would face direct hazards. Construction workers could be exposed to undiscovered contaminants. Indirect hazards to nearby residences, businesses, and wildlife could also occur through contact with the materials at the site or in transit. Without clean-up, any existing health risks would remain indefinitely.

Construction under all Alternatives could release toxic air contaminants. Alternative A could release toxic contaminants in channel sediments during dredging and disposal of dredge spoils.

For more detail on construction impacts related to hazardous wastes, see Volume Two, pp. VI.N.27-38. See p. VI.F.12 for information on toxic air contaminants and p. VI.L.25 for information on toxic contaminants from dredging in Alternative A.

Mitigation Measures

Three measures are included to mitigate construction impacts on air quality. One measure would establish a dust control program for demolition, excavation, grading, and construction; it would include sprinkling unpaved construction areas, speed limits for construction vehicles, covering haul trucks and minimizing haul distances, covering storage piles and construction debris, using canvas drapes around building floors during application of mineral-based fire insulation, and restricting dust-producing activities to periods of low wind. Another measure would institute a street cleaning program to reduce resuspension of road dust, and the last measure would monitor particulates (PM_{10}) to determine whether additional mitigation measures should be required.

Two mitigation measures are provided for construction noise, applicable to all Alternatives. One measure provides ways to reduce impacts from construction noise, other than pile driver noise, to ensure compliance with the San Francisco Noise Ordinance. The other measure relates to special noise abatement techniques for pile driving that could be ordered by the City under the Noise Ordinance.

One mitigation measure would reduce construction energy consumption by using less energy-intensive materials and construction methods where feasible.

Two construction mitigation measures related to geology and earthquakes are included. One measure would require that construction materials and equipment, including cranes, be secured and that safety harnesses be used by construction workers to minimize hazards in the event of an earthquake. The other would require basements to remain above the water table to preclude the need for dewatering and would require street construction at existing grades or above to reduce the amount of excavation and the potential to encounter groundwater.

Four construction mitigation measures related to hydrology and water quality are included. The first, applicable to all Alternatives, would reduce the potential for erosion of soil storage piles or surcharges by installing filter fences, planting vegetation, or covering the soil. Three measures applicable to Alternatives A and B would reduce dredging impacts by avoiding dredging at times when turbidity levels would be high independent of dredging, excessive

suspended materials would be carried into the Bay, or during herring spawning, and employing specific dredging techniques.

Three measures calling for comprehensive site investigations and a coordinated clean-up program in Alternatives A and B would reduce construction hazards from hazardous materials. One measure specifies safety measures for all Alternatives to protect against hazardous airborne dust and toxic gases that could be released.

For vegetation and wildlife, one measure applicable to Alternatives A and B requires dredging between March and November to eliminate any impact to the Pacific herring fishery.

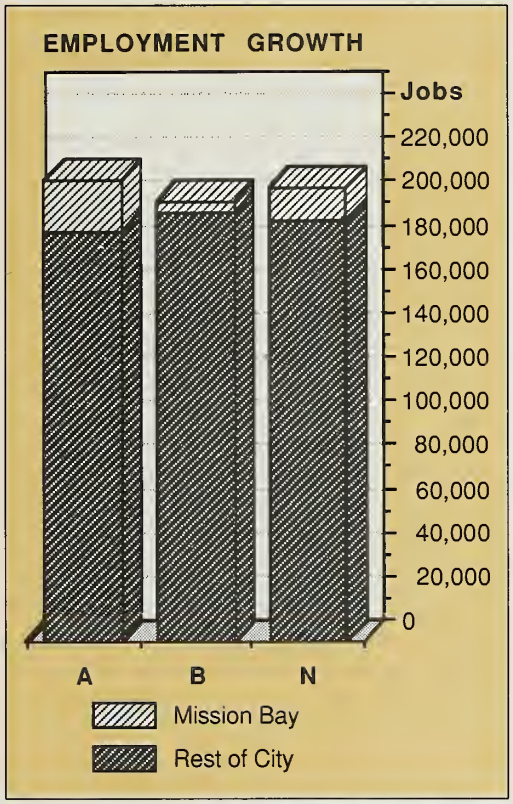
See Volume Two, pp. VI.F.23-25, for measures to reduce construction impacts on air quality, pp. VI.G.30-31 for noise, p. VI.H.21 for energy, p. VI.K.49 for geology, p. VI.K.51 for earthquakes, p. VI.L.35-36 for hydrology and water quality, p. VI.M.25 for vegetation and wildlife, and p. VI.N.39-45 for hazardous materials.

GROWTH INDUCEMENT

This section summarizes Mission Bay's effects on San Francisco and Bay Area growth. All Mission Bay Alternatives would add to business activity and employment in the City; Alternatives A and B would add to housing and population in the City. Differences in citywide growth do not parallel differences among Alternatives in Project Area employment or housing because, for example, less growth in Mission Bay would mean more commercial or residential development elsewhere in the City. For the region, there would not be much difference among Alternatives in total employment and population growth, but there would be some differences in the locations for growth and development in the Bay Area. Those different patterns for the location of job growth in the region would result in different locations for population growth and associated impacts stimulated by employment growth. Some Mission Bay activity would support business outside the Project Area through the multiplier relationship, while, at the same time, some economic activity in Mission Bay would be supported by businesses outside the Project Area. Spillover effects of Mission Bay would influence the pace and type of growth and change in Nearby Areas.

San Francisco & Bay Area Growth

Employment and population growth in San Francisco would vary by Alternative. The more employment or population in Mission Bay, the larger the citywide totals. The differences in citywide growth reflect more than the simple difference among the Alternatives. There are other locations besides Mission Bay where businesses will expand or housing will be developed, depending on the amount of commercial or residential development in Mission Bay. Consequently, the Alternatives would affect the location of development in the City as well as the amount of employment and population growth. The Alternatives would affect San Francisco population growth more than employment growth because there are more locations in the City for business expansion and commercial development than there are for residential development.



SOURCE: Recht Hausrath & Associates

Figure II.66: Contributions of the Alternatives to San Francisco Employment Growth, Existing to Build-Out. *Alternative A would contribute the most to San Francisco employment growth, about 9,200 more jobs than Alternative B, which has the least employment growth. Citywide employment growth with Alternative N would fall in between Alternatives A and B; Alternative N would contribute 5,900 more jobs than Alternative B, but 3,300 fewer jobs than Alternative A.*

From a regional perspective, the choice of an Alternative for Mission Bay would not make much difference in total employment and population growth expected through 2020. There would, however, be differences among Alternatives in the locations of growth and development in the Bay Area.

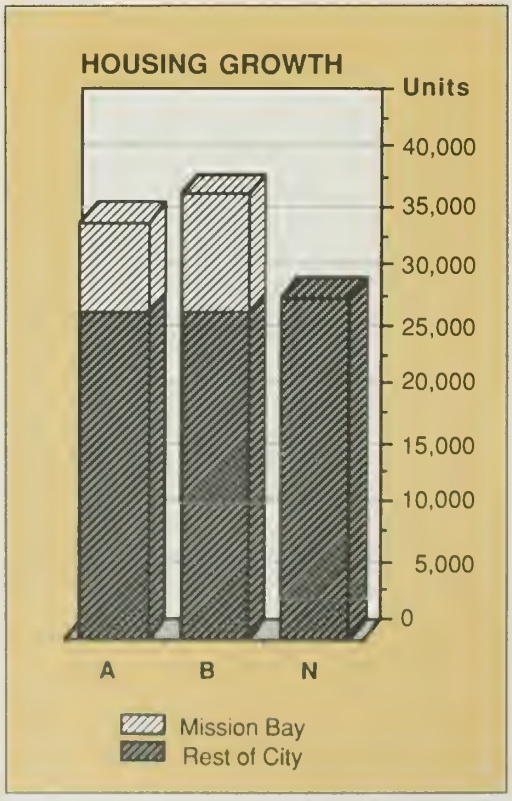
For more detail on Mission Bay's impacts on San Francisco and Bay Area growth, see Volume Two, pp. VI.O.1-5.

Employment Growth & Population

Employment growth depends on workers to fill new jobs. Workers come from several sources: new residents in the area, people joining the labor force after finishing school, deciding to return to work, or taking a job for the first time, and unemployed people finding jobs. New residents represent the population growth stimulated by employment growth.

The choice among Mission Bay Alternatives would have little impact on total regional employment. Employment growth in the Bay Area through 2020 would be essentially the same for each Alternative. Therefore, from the cumulative perspective, the choice of one Mission Bay Alternative over another would not affect the amount of induced population growth attributable to employment growth.

Although not a major factor in regional employment totals, the Alternatives would have some effect on the location of job growth throughout the region. Differences among Alternatives in job locations would lead to differences in the locations of induced population growth and associated housing demand and other public service and infrastructure requirements. Alternative A would result in more induced population growth and associated housing and other service demands centered on San Francisco and relatively less in the rest of the region compared to the other Alternatives. Because Alternative B would result in less employment in the Project Area and more elsewhere in the region, there would be more associated population growth and impacts in the rest of the region and less in San Francisco. Alternative N would result in more induced effects in the City than Alternative B and more induced effects in the rest of the region than Alternative A.



SOURCE: Recht Hausrath & Associates

Figure II.67: Contributions of the Alternatives to San Francisco Housing Growth, Existing to Build-Out. *Alternative B would contribute the most to housing growth in the City. There would be about 8,800 more housing units in the City by 2020 with Alternative B than with Alternative N, which adds no housing. There would be about 6,400 more units with Alternative A than with with Alternative N.*

For more detail on the relationship between employment growth and population, see Volume Two, pp. VI.O.5-6.

Multiplier Effects

Multiplier effects account for economic interrelationships through which businesses support other business, business activity supports household spending, and household spending generates sales and economic activity. Future economic activity in Mission Bay is related to economic activity elsewhere in the City and region. Some Mission Bay activity would support businesses outside the Project Area. Project Area and related business activity would provide wages and salaries that support household spending for consumer goods and services.

At the same time, some economic activity in Mission Bay would be supported by businesses outside the Project Area. Thus, not all Mission

Bay commercial and industrial development would generate economic activity through multiplier effects. Some would accommodate activity generated from other locations.

For more detail on multiplier effects, see Volume Two, pp. VI.O.7-8.

Spillover Effects

Over time, Mission Bay development and associated infrastructure and public service improvements would affect the land use and residential character, as well as the economic activity, of areas beyond the Project Area boundaries. Those areas (South of Market, Showplace Square, North Potrero, Potrero Hill, Lower Potrero, Central Bayfront, Inner Mission, and South Bayshore) would change even without Mission Bay development. However, Mission Bay would affect the pace and types of changes that would occur.

For more detail on spillover effects, see Volume Two, pp. VI.O.8-9.

VARIATIONS ON ALTERNATIVES

In addition to the three Alternatives (A, B, and N), ten variants of the Alternatives are evaluated in the EIR. Each variant is based on one or more of the Alternatives, with certain changes. Differences between the impacts of each variant and its parent Alternative are addressed.

Six variants involve changes in land use and density. Those variants would:

- *1) Add 1,000 housing units to Alternative N;*
- *2) Replace residential, open space, and S/LI/RD uses east of Third Street in Alternative B with Port-Related/M-2 uses;*
- *3) Reduce housing in Alternative B from 10,000 to 7,700 units;*
- *4) Replace some S/LI/RD in Alternative A with retail, personal service, and community facility uses;*
- *5) Replace some S/LI/RD in Alternative A with offices; and*
- *6) Increase height limits from 110 feet to 220 feet for some residential structures along Fifth Street in Alternative B.*

Four variants involve changes in other aspects of development. They would:

- *7) Allow offices as a primary S/LI/RD use in Alternatives A and B;*
- *8) Vary the amount and size of affordable housing units in Alternatives A and B;*
- *9) Keep the CalTrain station in its present location in Alternatives A and B; and*
- *10) Reduce seismic hazards in all Alternatives.*

1. Housing in Alternative N

This variant would add about 1,000 housing units and about 1,975 residents to Alternative N. The M-2 Industrial space replaced by the housing is assumed to relocate elsewhere within the Project Area. This variant would be more responsive than would Alternative N to policies of the Central Waterfront Plan by providing housing south of China Basin Channel as well as continued opportunities for industry-related business activities.

Housing in this variant would help to offset some of the demand for San Francisco housing associated with employment growth in Mission Bay, satisfying about half the demand generated by Alternative N. Residents would increase the demand for community services. Increases in fire and police calls would result. About 225 students would need school space. Public open space assumed to be provided around China Basin Channel would not be sufficient to satisfy the residential demand.

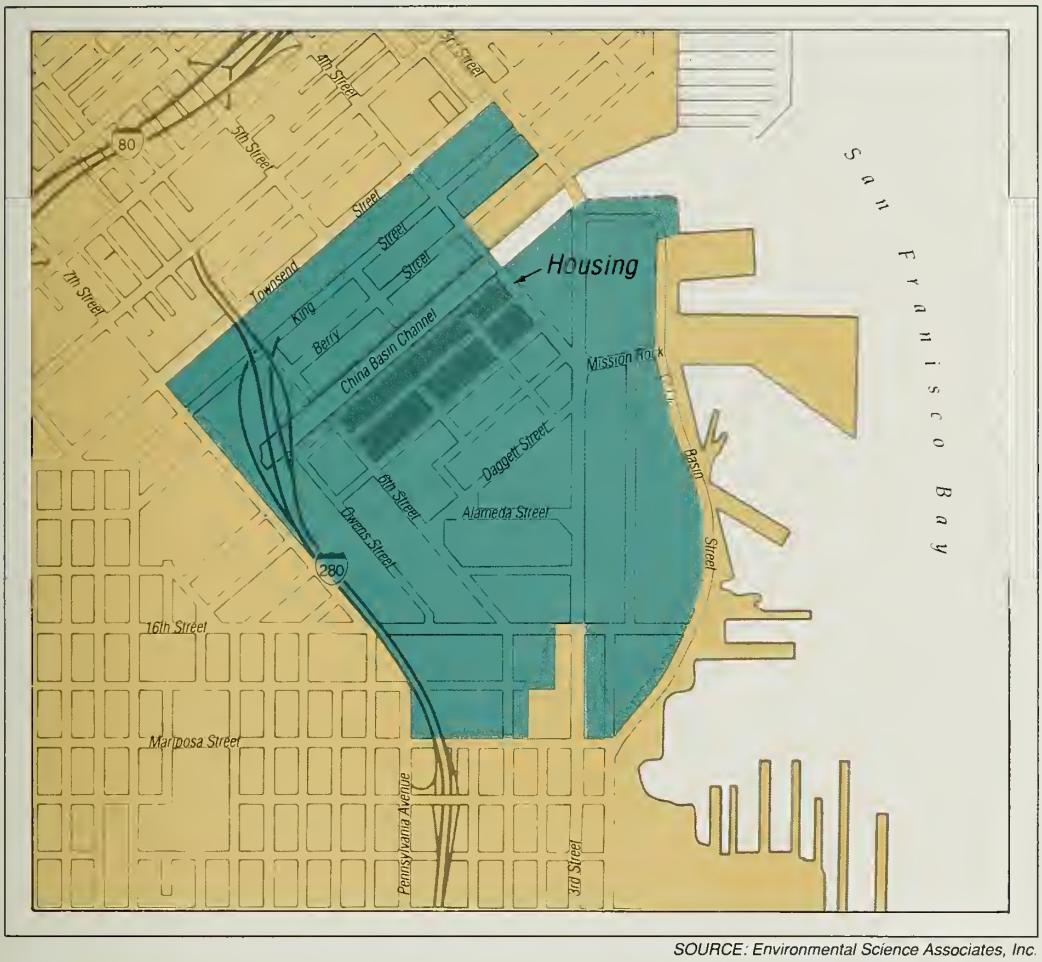
The housing proposed in this variant would be located in the quietest portions of the Project Area, resulting in the least conflict between ambient noise levels and development. However, land use conflicts involving intermittent loud noises or hazardous materials could develop between housing and nearby industrial activities.

Mitigation measures for Variant 1 include the housing-related mitigation measures listed for Alternatives A and B, all the measures listed for Alternative N, and three additional measures. Those include expanding existing schools to accommodate additional students, providing more open space, and requiring noise analyses prior to housing construction.

For more detail on Variant 1, see Volume Two, pp. VII.1-9.

2. Port-Priority in Alternative B

This variant would replace housing, open space, wetlands, and S/LI/RD uses east of Third Street proposed in Alternative B with Port-Related/



SOURCE: Environmental Science Associates, Inc.

Figure II.68: Variant 1. *This variant would add about 1,000 housing units south of China Basin Channel to Alternative N. It would respond to Central Waterfront Plan policies calling for housing south of China Basin Channel and continued opportunities for industrial activities.*

M-2 uses. About one million square feet of building space and 41 acres of land would be used for Port-Related/M-2 activities. Compared to Alternative B, this variant would reduce housing by 2,320 units, eliminate 20.6 acres of wetlands, eliminate all S/LI/RD space, and reduce community facilities by 1.8 acres. Total employment would remain about the same as under Alternative B, but about 1,100 jobs would shift to Port-Related/M-2 jobs from other types.

This variant would be responsive to Central Waterfront Plan, BCDC, and Port designations of the area east of Third Street for port-related use. Reservation of land east of Third Street for port-related use would provide the necessary backland for potential future development of a container terminal at Mission Rock.

Port-Related land uses east of Third Street and housing west of Third Street could be incompatible, particularly if a marine container terminal were developed. Noise from Port-Related activities could disturb residential and open space areas.

Under this variant, there would be about 4,400 fewer Mission Bay residents than in Alternative B. Housing units provided would still exceed housing demand created by Mission Bay jobs, although there would be fewer surplus units available to satisfy other demand.

Demand for fire, police, schools, and other community services would be lower in this variant than in Alternative B. However, there would continue to be a shortage of open space to

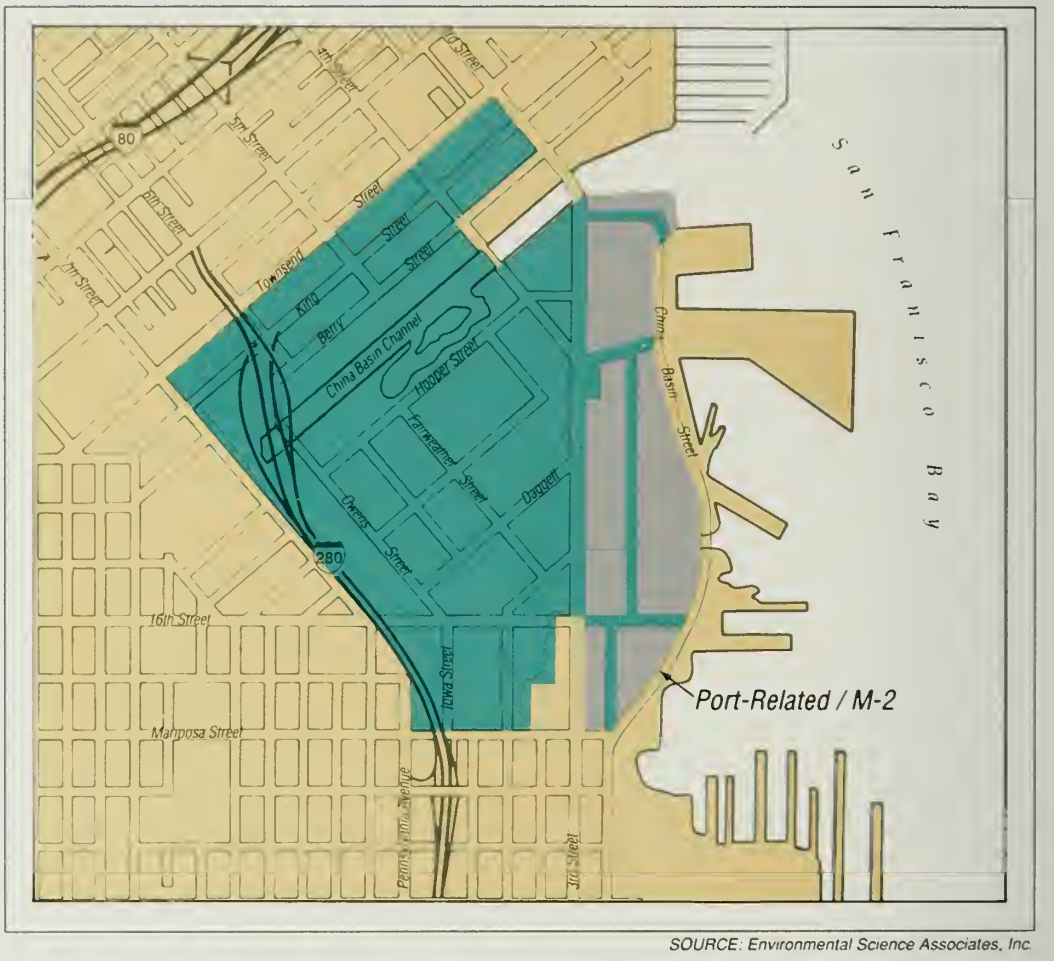


Figure II.69: Variant 2. This variant would replace uses east of Third Street proposed in Alternative B with Port-Related/M-2 uses. Port-related uses would be consistent with Central Waterfront Plan, BCDC, and Port designation of the area for port-related use.

SOURCE: Environmental Science Associates, Inc.

accommodate residential demand in the Project Area. Open space provided would not satisfy the residential demand for open space. Elimination of two of Alternative B's three wetlands in this variant would reduce wildlife habitat.

Project Area traffic and air emissions would be lower in this variant than in Alternative B. Unlike Alternative B, the increase in hydrocarbon emissions would not exceed the 1% significance threshold, although emissions of carbon monoxide and nitrogen oxides would still exceed 1% of countywide transportation emissions.

Mitigation measures for Alternative B would apply to Variant 2 with two differences. This variant would require one less fire engine company than Alternative B, and as there would be more truck traffic along Third Street, noise mitigation measures would be more important and could include a noise wall along the west side of Third Street.

For more detail on Variant 2, see Volume Two pp. VII.10-19.

3. Less Housing in Alternative B

This variant would reduce housing densities in Alternative B, reducing the total number of units from 10,000 to 7,700. The total popula-

tion under this variant would be about 17,100, about 1,500 less than in Alternative B. Commercial, open space, and other uses would be the same.

Although this variant would have the same number of units as Alternative A, housing densities would be lower and housing units would be larger, resulting in more residents than in Alternative A. Housing units provided would still exceed the demand for San Francisco housing created by Mission Bay jobs, although there would be fewer surplus units available to satisfy other demand.

With fewer residents, this variant would have less demand for community services than Alternative B. There would be fewer vehicle trips under this variant, with corresponding reductions in air emissions and transportation energy consumption. The overall scale of buildings would be lower and more uniform than in Alternative B; view blockage would be reduced across the Project Area.

Mitigation measures for Alternative B would apply to this variant.

For more detail on Variant 3, see Volume Two, pp. VII.19-24.

4. Replace Some S/LI/RD in Alternative A with Retail & Other Uses

This variant would replace 275,000 square feet of S/LI/RD space in Alternative A with retail and commercial space and provide a two-acre community service site along Owens Street suitable for a school. The retail and commercial space would consist of about 185,000 square feet of ground-floor retail space and about 90,000 square feet of second-floor personal and business service space. The personal service space would be used for health clubs, hair salons, photocopy and printing shops, small professional and medical offices, and similar services. Alternatives A and B would not provide space for those types of businesses. The block bounded by Long Bridge, Third, 15th, and 16th Streets would be devoted to 40,000 square feet of retail space, suitable for a supermarket. Housing displaced from the new community service and large retail sites would be relocated to the block east of Third Street between 15th and 16th Streets.

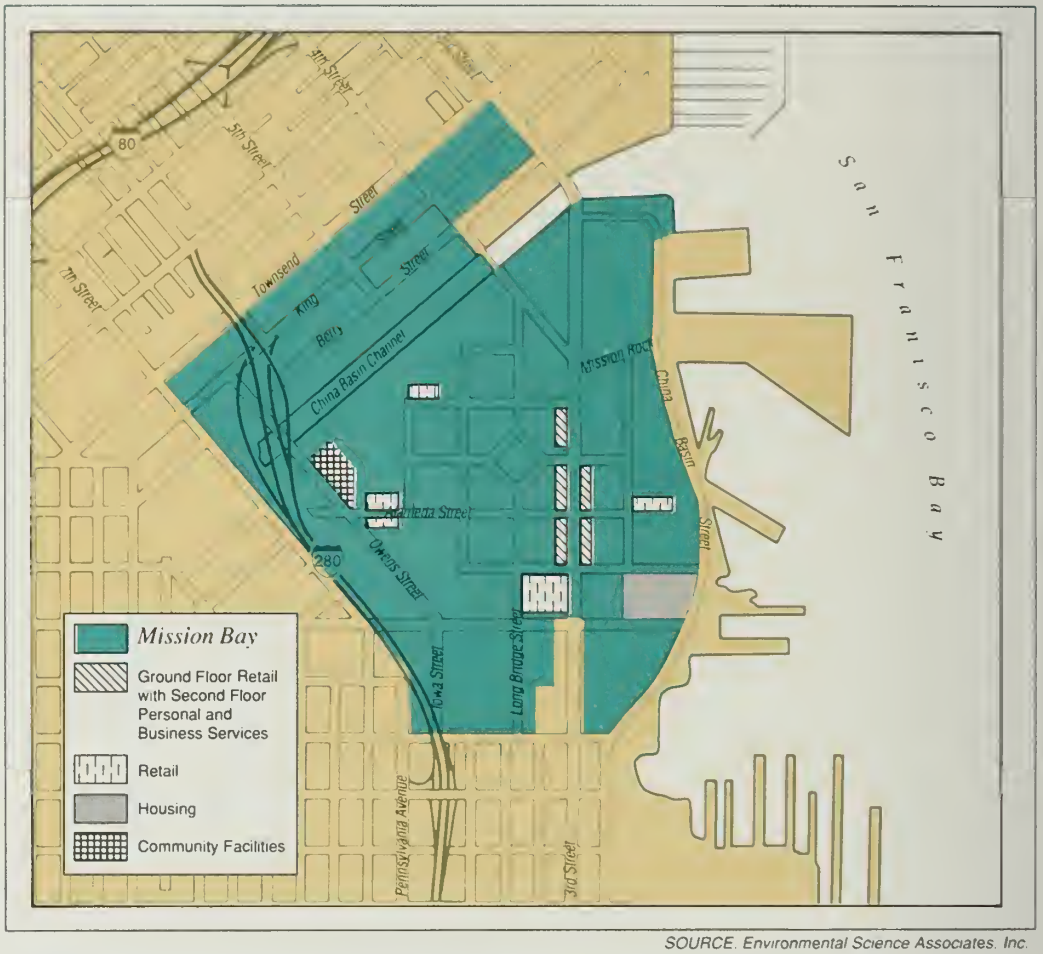
The population under this variant would be about the same as in Alternative A. There would be about 330 more jobs under this variant; 645 S/LI/RD jobs under Alternative A would be replaced by 840 retail and service jobs and 135 community facilities jobs. More of the retail spending of Project Area residents and workers would be captured in Mission Bay with this variant than with Alternative A. To the extent that the retail space were developed as small stores and restaurants, it would compete with other nearby neighborhood shopping areas, reducing sales growth in those areas.

The two-acre community facilities site could be used for a school. Alternatively, it could be used for police, fire, or other facilities. The site would be relatively noisy for a school. Twenty-four-hour noise levels near Owens Street exceed 65 dBA, L_{dn}; noise analyses and reduction measures would be required. Future peak-hour noise levels from traffic on the I-280 overpass about 100 feet west of the site and the relocated CalTrain station about 300 feet to the southwest could reach 70 dBA, L_{eq}, a noise level high enough to interfere with outdoor activities.

Mitigation measures for Alternative A would apply to this variant. Two additional measures would require analysis and incorporation of noise reduction measures into building designs for a school on Owens Street and retail uses along Third Street.

For more detail on Variant 4, see Volume Two, pp. VII.24-32.

Figure II.70: Variant 4. *This variant would replace 275,000 square feet of S/LI/RD space in Alternative A with retail and commercial space and provide a two-acre community service site suitable for a school along Owens Street. There would also be a site large enough for a supermarket and space for personal and business service uses not available in Alternatives A and B.*



SOURCE: Environmental Science Associates, Inc.

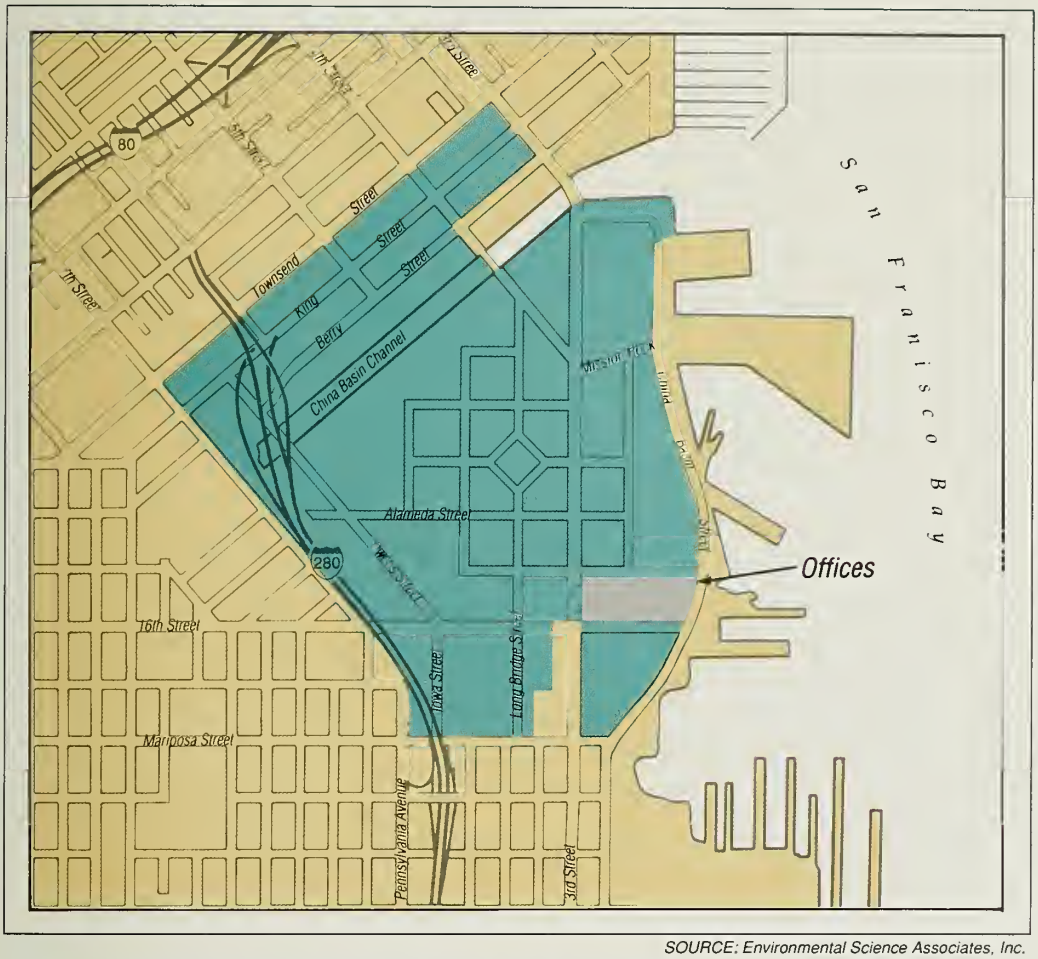
5. Offices East of Third Street in Alternative A

This variant would replace about 580,000 square feet of S/LI/RD space east of Third Street between 15th and 16th Streets in Alternative A with 600,000 square feet of office space. All other uses would be the same as in Alternative A.

There would be about 2,100 more office jobs and 1,400 fewer S/LI/RD jobs in this variant than in Alternative A, an increase of about 700 jobs. That would be about a 3% increase in total employment. There would be more jobs for clerical and professional/technical workers and fewer jobs for service and other workers. There would be more housing demand associated with job growth, but the number of housing units built would still exceed the demand created by job growth.

Office space is more sensitive to noise than S/LI/RD space. Noise reduction measures would be required in building design. Because of the relatively low density assumed for office development east of Third Street in this variant, buildings would likely be low in scale.

For more detail on Variant 5, see Volume Two, pp VII.32-37



SOURCE: Environmental Science Associates, Inc.

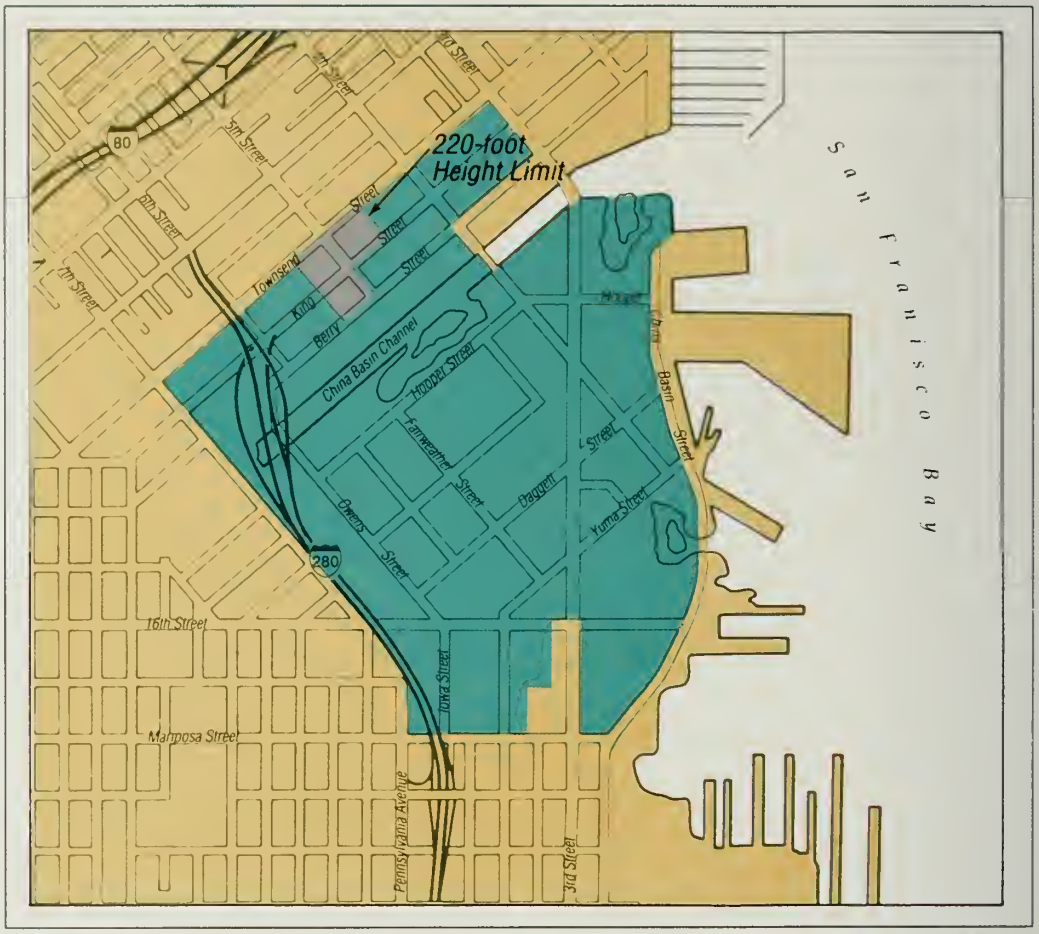
Figure II.71: Variant 5. *This variant would replace S/LI/RD uses east of Third Street in Alternative A with offices. It would provide about 700 more jobs than Alternative A, an increase in employment of about 3%.*

6. Increased Housing Heights in Alternative B

This variant would increase the heights of residential buildings on three corners at Fifth and King Streets in Alternative B. The buildings would be up to 220 feet high, with 20 stories of housing above two stories of retail. The number of dwelling units and residents in this variant would be the same as in Alternative B.

The buildings would have to conform with stricter high-rise requirements of the San Francisco Fire Safety Code. The buildings, about twice as high as the maximum height in Alternative B, would be more prominent in street-level and long-range views. From Potrero Hill, the three tall buildings would contrast with the low- to mid-rise scale of Alternative B and South of Market neighborhoods. From within Mission Bay, the 22-story residential towers would be visible above other buildings.

The buildings in this variant would cast longer shadows than those of Alternative B. Shadows would not reach public open space outside of the Project Area, but would shade Mission Bay open space north of the channel. The 220-foot towers could increase ground-level wind speeds



SOURCE: Environmental Science Associates, Inc.

Figure II.72: Variant 6. This variant would allow residential buildings up to 220 feet tall near Fifth and King Streets, providing more variation in scale north of the channel. Buildings of that height could increase local ground-level wind speeds.

on sidewalks and open space near Fifth and King Streets.

The buildings would be supported by piles. Hazards from falling glass and cladding during an earthquake would be higher, as would those from movement of building contents on the upper stories.

Mitigation measures for Alternative B would apply to this variant. In addition, the buildings' wind effects would be reviewed to evaluate the need for wind-break features or detailed wind-tunnel studies.

For more detail on Variant 6, see Volume Two, pp. VII.37-41

7. Offices in S/LI/RD in Alternatives A & B

This variant expands the S/LI/RD land use designation in Alternatives A and B to include office as a primary use, instead of limiting office to an accessory use. The result would be more total employment and job opportunities than with the more restrictive S/LI/RD designation. If, for example, one-half of S/LI/RD development in Alternative A were occupied by office activities, then S/LI/RD employment at build-out would be about 9,900 instead of 8,400. That difference would represent about 18% more S/LI/RD employment and about 6% more total employment in the Project Area. Similarly, in Alternative B there would be about

1,100 workers in S/LI/RD development at build-out instead of 900 if one-half of S/LI/RD development were occupied by office activities. That would be an increase of about 22% in S/LI/RD employment and about 3% in total employment in the Project Area.

With office as a primary use in S/LI/RD, there would be a different mix of types of jobs, with more jobs for clerical and professional/technical workers and fewer jobs for service and other workers. More office activity in Mission Bay would require more housing under the Office Affordable Housing Production Program; more total employment would mean more overall housing demand associated with Project Area employment growth compared to Alternatives A and B. The differences would be relatively small, however. Since the larger amount of employment in the Project Area that would result would most likely represent a shift of business activity that otherwise would locate elsewhere in the City to Mission Bay, cumulative housing demand would be the same as with Alternatives A and B.

This variant would not result in further additions to citywide employment growth or to associated population growth as compared to Alternatives A and B. With more office development in the Project Area, there would be relatively less pressure for growth and change in Nearby Areas due to office development. However, because there would be less S/LI/RD development in this variant, there would be relatively more pressure on those areas due to S/LI/RD development. There would be small increases in demands for community services in the Project Area compared to Alternatives A and B and more travel at certain locations and intersections. Other environmental effects of this variant would be the same as those of Alternatives A and B.

For more detail on Variant 7, see Volume Two, pp. VII.41-47.

8. Varying the Amount & Size of Affordable Units in Alternatives A & B

This variant discusses the implications of varying the proportion of Mission Bay housing units that would be affordable from the 30% assumed for Alternatives A and B. It also discusses the implications of providing more larger affordable units and fewer smaller ones, while keeping the number of affordable units the same.

With the same number of housing units in the Project Area and the same mix of unit sizes, variations in the percentage of affordable housing would make only small differences in total Project Area population. There would be more households with relatively low incomes and probably more children and elderly residents than in Alternatives A and B. Providing more larger units and fewer smaller units would have more direct effects on the number of people in the Project Area. There would be more larger households as more families with children could live in the Project Area, and there would be fewer households of only adults, particularly elderly adults.

Generally, the more affordable housing units provided in the Project Area, the more positive will be Mission Bay's contribution to the City's housing market, because such units are difficult to produce and will continue to be in strong demand. For Alternative A, if the percentage of affordable housing were higher than 36%, Mission Bay housing would be able to accommodate demand for affordable housing in the City besides that associated with Project Area employment growth. For Alternative B, a large share of the affordable housing (assuming 30% of total units were affordable) already would be available to accommodate other demand besides that associated with Project Area employment growth. Variations in that percentage would affect the amount of such housing that

would be available. With regard to the sizes of affordable units, producing more larger affordable units in Mission Bay could benefit those households whose options for family housing in San Francisco otherwise would be very limited.

There would be some differences in community service demands depending on differences in total population as well as on differences in special populations such as the elderly or school-age children. The larger unit sizes in these variations of Alternatives A and B would result in small potential differences in total citywide population. Design changes to accommodate the larger unit sizes would also be small. Other environmental effects of these variations would be similar to those of Alternatives A and B.

For more detail on Variant 8, see Volume Two, pp. VII.47-51.

9. Caltrain Station Location in Alternatives A & B.

Alternatives A and B assume that the CalTrain station would be relocated to Seventh and Channel Streets. This variant would keep the CalTrain Station at its present Fourth Street location. To avoid changing the land use programs in Alternatives A and B, this variant would require an underground station at Fourth and King Streets and a subway for CalTrain from about 16th Street to the new underground station.

In this variant, CalTrain ridership could be up to 22% higher than in Alternatives A and B (estimates vary, with some as low as 5%). BART ridership from the West Bay and SamTrans ridership from the South Bay would be about 9% and 11% lower, respectively, than in those Alternatives. CalTrain, SamTrans, and BART service from the West Bay would continue to operate at comfortable to excellent levels of service, about the same as in Alternatives A and B.

Vehicle volumes on Highway 101 and I-280 from the South Bay would be about 5% less than those projected for Alternatives A and B. That decrease would not substantially affect the duration of congestion or levels of service projected for U.S. 101.

The new underground station at Fourth and King Streets could serve as a temporary terminal if CalTrain service were extended into downtown. Once an extension was completed, the Fourth and King Street station would primarily serve Mission Bay, Showplace Square, South of Market, and South Beach travelers.

For more detail on Variant 9, see Volume Two, pp. VII.51-54.

10. Reduced Seismic Hazards in All Alternatives

This variant would limit Mission Bay development to areas subject to relatively less-severe earthquake hazards. Most of Mission Bay consists of filled bayland or marsh. Those areas are subject to liquefaction and "violent" groundshaking (see the section on Geology & Seismicity in this chapter). This variant would limit development to those areas estimated to undergo only "very strong" groundshaking.

Two areas of Mission Bay have bedrock near the surface and are less susceptible to earthquake hazards. Those areas are the northeastern corner of the Project Area, near Townsend Street west of Third Street, and the southwestern corner, south of 16th Street along I-280. It is assumed that office development would occur on the northeastern parcel and that M-2 Industrial or S/LI/RD uses would develop on the

SOURCE: Environmental Science Associates, Inc.

Figure II.73: CalTrain Station.
Variant 9 would replace the CalTrain Station at Fourth and Townsend Streets with a new underground station at the same location. That would require construction of a subway for CalTrain from about 16th Street to the new station. CalTrain ridership would be greater than with Alternatives A and B.

southwestern parcel, as in Alternatives A and N. The rest of Mission Bay would either remain as rail yards or low-intensity warehousing and trucking uses or could be vacated as rail uses were discontinued.

Environmental effects in the northeastern and southwestern portions of Mission Bay under this variant would be similar to those under Alternatives A and N. There would be no direct adverse impacts in other areas, although most of Mission Bay would remain underused and any contaminated soils present in the Project Area would remain.

A plan to severely limit development in Mission Bay and shift it to other areas of the City is unlikely because there is little vacant land in San Francisco not subject to very strong or violent groundshaking, and no areas as large as Mission Bay are available for development. While a seismically safer variant would expose fewer people in Mission Bay to earthquake hazards, it is likely that development elsewhere would expose them to similar hazards. Seismic hazards in Mission Bay would be reduced through mitigation measures identified for Alternatives A, B, and N.

For more detail on Variant 10, see Volume Two, pp. VII.54-56.

UNAVOIDABLE SIGNIFICANT ENVIRONMENTAL EFFECTS

This section lists those significant impacts resulting from approval of one of the Alternatives or a variant of the Alternatives that could not be mitigated by changes in or additions to the project. The significant impacts listed are those for which mitigation measures are not available or which could not be mitigated to a level of insignificance.

• Alternatives A and B would change the principal types of land uses in the Project Area. Housing, office, and retail uses would replace existing railroad, industrial, warehousing, and transportation uses and vacant land.

• Housing and other non-maritime uses east of Third Street under Alternatives A and B would preclude container terminal development on piers adjacent to the Project Area. That would be an unavoidable significant impact unless a land exchange or similar arrangement is determined to meet container handling capacity needs for the region.

• Increased housing under Alternatives A and B and employment under all Alternatives would result in increased use of all transportation systems, contributing to unavoidable significant cumulative traffic impacts in 2000 and 2020. Cumulative traffic would result in expanded congestion on the regional freeway system and on transit. Although mitigation measures are identified in the EIR, the contribution of the Mission Bay Alternatives to expanded cumulative congestion is included as an unavoidable significant effect. That is because many of the measures identified would require regional, state, and federal approvals, and implementation over a long period that exceeds most regional transportation planning horizons.

• All Alternatives would result in increased travel to and from San Francisco, contributing to cumulative vehicle emissions within the Air Basin. Those emissions would increase the frequency of violations of air quality standards for particulate matter (PM_{10}) and for ozone during periods of poor ventilation, with concomitant health effects and reduced visibility. Emissions from Project Area travel would also exceed 1% of countywide emissions of carbon monoxide, hydrocarbons, and nitrogen oxides for all Alternatives at build-out.

• All Alternatives would have a significant seismic safety impact, as they would accommodate a higher residential and/or employee population that would be subject to substantial danger during a major earthquake. If more-stringent building standards were adopted for new construction, the Alternatives would be as safe or safer than other areas in San Francisco, thereby reducing risk.

• Dredging for Alternative A in China Basin Channel and disposal of the material at either an ocean or Bay (likely to be Alcatraz) disposal site could cause unavoidable potentially significant impacts in the channel and at the disposal site by releasing contaminants into the water column. Should the sediments contain contaminants that violate public health standards or exceed ecological effects thresholds, dredging would cause temporary but unavoidable significant effects on water quality and biologic resources in the channel. If it is determined that the sediments violate standards or thresholds for contaminants, Bay or ocean disposal would be prohibited; land disposal would instead be required as a condition to issuance of permits by the Army Corps of Engineers, thus avoiding water quality impacts in the Bay or ocean.

For more detail on unavoidable significant environmental effects, see Volume Two, pp. VIII.1-4. See p. IX.1 for a discussion of the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity. See p. X.1 for information on significant irreversible environmental changes which would be involved in the proposed action should it be implemented.

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197
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